OCTOBER, 1908.

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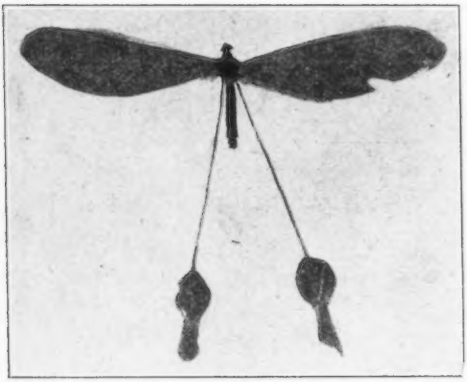

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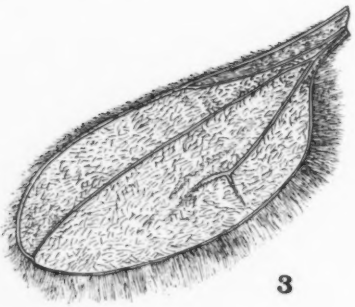

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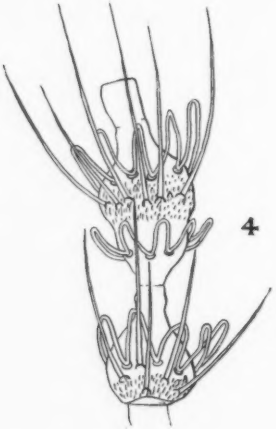

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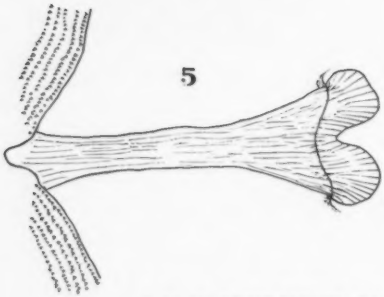

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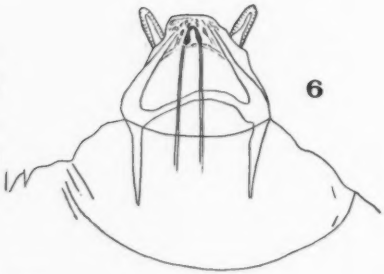

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A NEW CECIDOMYIID ON OAK—RUSSELL AND HOOKER.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XIX. OCTOBER, 1908. No. 8.

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A New Cecidomyiid on Oak.

BY H. M. RUSSELL AND C. W. HOOKER,

Massachusetts Agricultural College, Amherst, Mass.

(Plate XIV)

This insect was discovered by Mr. W. V. Tower, in July, 1905, working on the leaves of a black oak. He began observation on its life history but was called away and the work was taken up by Mr. H. M. Russell. Mr. Russell had practically finished, except for describing the adult, when he left to take a position with the U. S. Department of Agriculture and the subject was placed in my hands to complete. In addition to verifying Mr. Russell's observations, I have described the adult, which Mr. E. P. Felt kindly determined as a new species. The gall which it forms has been described by Osten Sacken as *C. crubescens.**

This species of gallfly is very abundant on a black oak (*Quercus coccinae* var. *tinctoria* group) growing near the President's house on the college grounds. This oak is in a small clump of red oaks, none of which have become infested; this seems to indicate that this Cecidomyia will feed only on black

* Mon. N. A. Dipt. I, p. 200, n. 20, 1862, "Folded margin of an oak leaf, tinged with red. This deformation seems to resemble that of C. quercus Lw. on the European oaks. Occurs in the spring."

oak, as the infested tree harbors many thousands of the larvae and under its branches, the adults are found in swarms. Every leaf is infested, by from one to over one hundred, as high up as one can climb, certainly within ten feet of the top; but the infestation at the highest point is not as extensive as that of the lower limbs.

Cecidomyia (?) **foliora** n. sp.*

Female.—Length, 1.95 to 2.55 mm. Antennae of 14 segments, length .95 to .99 mm.; the two basal segments light yellow, the others brown, thickly clothed with coarse brown hairs. Face bright orange-red; back of head with a fringe of dark brown setae. Mesonotum Van Dyke brown, with pale submedian lines, sparsely covered with fine setae. Sternum, pro and metapleura light brown, mesopleura dark brown. Abdomen with the five basal segments bright orange-red, thence gradually fading to a light yellow at the apex and lemon yellow on the protrusible ovipositor;—within a few days the color of the ovipositor often darkens to an orange-red. Surface sparsely clothed with yellow setae. Legs light yellow, thickly covered with dark brown pubescence.

Male.—Length, 1.20 to 1.65 mm. Antennae 1.50 to 1.65 mm. Scutellum orange-red; pleura pale brownish yellow, mesopleura marked with black. Abdomen orange-brown.

The large bright orange-red abdomen and larger size of the females, make them quite conspicuous among the smaller males with their dull-colored abdomens. The color darkens within a few days after collecting, so that fresh material is necessary for identification; the gall, however, is quite characteristic and cannot be mistaken.

Described from nineteen specimens on eight pins, and from sixteen specimens mounted on six microscopic slides—eighteen male and seventeen female cotypes. These have been deposited as follows: Two females and one male (one slide), and two females and three males (two pins) in the collection of the United States National Museum at Washington, D. C.; two females and one male (one slide), and two females and three males (two pins) in the collection of the New York State Entomologist, Albany, N. Y.; the remainder—five females and five males (four slides), and four females and five males (four pins) in the collection of the Massachusetts Agricultural College.

* Foliora from *folium*, leaf and *ora*, edge.

Six females and seventeen males (six slides) and five females and six males (six pins) from the same series have been marked Paratypes and are in the collection of the Massachusetts Agricultural College, as are also slides of the early stages.

This insect may ultimately prove to belong to another genus, but I follow Dr. Felt (in litt.) in referring it tentatively to Cecidomyia.

LIFE HISTORY.

Adult.—The adult insect emerges from the ground from May 1 to 20, and all have disappeared by June 1. In the spring of 1908, the author caught five adults May 4, and by May 11 the insects were found under the tree in thousands, being so numerous that it was only necessary to sweep an open cyanide jar over the top of and through the grass to obtain all the specimens desired. The adults appear just as the leaves begin to unfold. For a time, after emerging, large numbers will be found in the early morning and on wet days especially, under the tree, but as it gets warmer and the dew dries off, they rise among the branches. They have a feeble flight, however, and do not fly out beyond the borders of the tree. When the leaves are one to two inches long, the females fly to the leaves and begin to lay their eggs, for the most part on the under side.

Eggs.—The eggs are laid without any regular order, attached to the leaf by the posterior pole and placed diagonally to the plane of the leaf surface. The egg is minute, appearing to the eye like a reddish protuberance. Under the microscope it is seen to be almost perfectly oval, .27 mm. long and .09 mm. wide. The surface is smooth and the egg shell transparent, the reddish color more intense at one end, being due to the larva inside. Most of the eggs are scattered irregularly between the veins on the lower surface, but a few are generally laid, apparently by chance, on the upper side. From fifty leaves, an average of seventy eggs was obtained for each, with not over six on the upper side, but the total number varied from forty to one hundred and twenty. On one leaf, an inch and three-quarters of an inch wide, there were two hundred and eighty-one eggs on the lower surface and one hundred and seventy-five on the upper. This, however, is an exceptional case.

Larva.—The larva hatches in from four to six days, the time varying with the weather. The body is pale orange, the head a shade darker. Length .27 mm.; width .10 mm. They go at once to the edge of the leaf, or to any hole in it, and begin to feed on the upper surface. After about four days of this feeding, the edge beings to curl over on to the upper surface, forming a roll, the upper side of which becomes

more or less reddish. Within this roll, the larva continues to feed, extending the roll as it grows. Occasionally, a young larva feeds for a time in a circle on the exposed surface of the leaf, causing it to become reddish and wrinkled. By May 22, nearly all the leaves near the ground show the rolls, which in some cases, nearly encircle the leaf, while in others, they may be about one-quarter of an inch long. In one roll, an inch long, twenty-five larvae were found; while in others, only a few were present. As a rule, the longer the roll, the fewer insects they contain relatively. The insects remain in the larval stage through the summer, becoming full grown by the last of September or first of October, when all but those parasitized descend into the ground and pupate to pass the winter. In exceptional cases, perfect larvae are not able to escape from the roll in the fall, and so pass the winter in the gall, emerging at the usual time in the spring through cracks or punctures in the drier rolls.

Parasites.—This gallfly is attacked by a chalcid egg parasite which appears at the same time in swarms almost as large as those of the host. The female chalcid walks around among the Cecidomyia eggs touching them rapidly with her antennae and stopping every now and then to insert her ovipositor and lay an egg in one of the host eggs, but neglects those surrounding it.

A species of mite was also found to be very abundant under and on the tree, and though it was not seen attacking eggs or larva, conditions were such that it may be considered as possibly a parasite.

EXPLANATION OF PLATE XIV.

1. Lower side of leaf showing galls, half natural size.
2. First stage of larva, not over six days old; just beginning to form galls on oak leaves. X 190.
3. Wing of *C. foliora.* X 25.
4. Segment of antenna of male; greatly enlarged.
5. "Wishbone" of full grown larva; greatly enlarged.
6. Dorsal view of head of full grown larva; greatly enlarged.

Mosquitoes Invade City.—Swarm Comes to Town and Plays Havoc Before Storm.—Just before the heavy storm last night a large swarm of mosquitoes flew into the city and caused a great deal of annoyance and plenty of work for physicians in the hospitals of the northeast section. In about fifteen minutes after the swarm struck the city the hospitals began to receive patients with their faces and hands so badly swollen that it was necessary in some cases to lance them to draw out the sting of the bite. On Girard Avenue, east of Belgrade Street, the pests stripped all the trees of their leaves. After they had passed the trees looked as though autumn had come.—*Philadelphia Press,* July 24, 1908. [!!!]

Insect Transmission of Bubonic Plague: a Study of the San Francisco Epidemic.

By M. B. Mitzmain, B.S.

The role of the flea in the transmission of bubonic plague lends particular interest to observations on the species of fleas infesting rats in the San Francisco epidemic.

In the present campaign of rodent extermination eighteen hundred rats have been examined by the writer. From the latter part of August to December 1st he spent much of his time in the plague-infected districts of San Francisco and other towns where the existence of the plague was suspected. In this connection an effort was made to locate the source of the rat and flea introduction into the infected regions.

SOURCE AND DISTRIBUTION OF SPECIES OF FLEAS.

From coasting ships and river steamers the common flea obtained was of the species *Ceratophyllus fasciatus* Bosc, and those collected from ships from oriental ports were of the species *Ctenopsylla musculi* Duges and *Pulex cheopis* Roth. There appeared to be a definite invasion of the introduced species. Along the water front and east to the Latin quarter in San Francisco there came to my obseravtion certain evidence of flea introduction. As far as could be determined the oriental rat flea seemed to disappear east of this line within ten city blocks, and only the common rat flea, *Ceratophyllus fasciatus*, made its appearance. In outlying districts I have not succeeded in collecting ship rat fleas. I have secured negative evidence to determine that the foreign fleas are alone responsible for plague transmission. On twenty plague rats not one of the alien species was obtained. The flea in evidence was that common to the Pacific coast, *Ceratophyllus fasciatus*. This species is the predominant rat flea in the counties bordering the bay. It was collected in San Francisco, Oakland, Point Richmond, and in districts where plague had been reported by the local health boards. At Point Richmond nineteen rat fleas were collected in a warehouse which was a probable source of human plague, and all proved to be the common species. From one in-

fected rat (*Mus decumanus*) taken from old Chinatown, ninety fleas were obtained, eighty-five per cent. of which were *C. fasciatus*. In Oakland, Alameda and Berkeley the rat flea *C. fasciatus* predominates to a marked degree. Ninety-five per cent. are the common species, the remainder being for the greater part *Ctenocephalus canis*, the cat and dog flea.

Ctenopsylla musculi Duges is suspected of being a recent immigrant. This species was first collected in North America by Dr. Duges from a seaport town in Mexico. It was originally described as a new species with the name *Ctenopsylla mexicana*. It is, however, synonymous with *Ctenopsylla musculi*. This species was found principally on ships from the orient and on one ship which came from Mexican ports *Ctenopsylla musculi* was found. It is found along the harbor front and one-half mile inland. Rats from the orient are no doubt responsible for its introduction into San Francisco.

Pulex cheopis Roth. originally was collected by Rothschild in Egypt, but is universal in its distribution. It has been recorded from southern Europe, Asia, Africa and Australia, but never from North America. This is the flea which is charged with eighty to ninety per cent. of insect transmission of plague in India. It was collected from ships in the harbor which had visited ports in the Philippines, Japan and Hawaii. It was collected in San Francisco two blocks from the water front on *Mus decumanus*, the brown rat. On shipboard its host was found to be the black rat, *Mus rattus*. On land it was found in company with *Ctenopsyllus musculi* on rats from a water front grain warehouse. Nine species of this flea, *Pulex cheopis*, were received from Assistant Surgeon Ebert, who removed them from his person. Dr. Ebert is an officer in the United States Public Health and Marine Hospital Service and employed in plague quarantine on ships from the orient and South America. It was while on duty sulfuring the holds of the S. S. "Mongolia" that he first became aware of the attacks of the parasites. Fortunately for the victim, the "Mongolia" enjoyed a clean bill of health. The significance of the oriental flea introduction may be appreciated by the fact that eight or ten cases of the

plague have been removed from shipboard since the present San Francisco epidemic.

Ctenocephalus canis Curtis on rats appears to be more numerous in the metropolis than on rats collected in the trans bay region. This species was perhaps contributed to the rat by its feline and canine hunters. This accounts probably for the greater number of *Ctenocephalus canis* found on rats in the more densely populated quarters. On shipboard *Ctenocephalus canis* was never collected from rodent hosts. The ship cat is not reputed to be a rat hunter. The constant petting and feeding by the sailors does not stimulate hunting natural prey and the inaccessibility of holds of vessels is a substantial check to rat catching. Thus an interchange of parasites between the two animals was not to be expected nor in any instance has it been known to occur. Numerous ship pets inadvertently left in the cabins during fumigation proved victims to the sulfur fumes. One species of flea only, the cat flea, was found on these.

Relatively few fleas of the human species *Pulex irritans* Linn. were obtained from live or dead rats. It was the least numerous of all the fleas found on animal hosts. Those collected were harbored by brown rats in a grain warehouse and stable in San Francisco.

In the study of ship rat fleas twenty-five vessels were inspected and methods of rat extermination investigated. The vessels in every instance were thoroughly sealed and fumigated with three per cent. SO_2 gas obtained from burning crude sulfur. The rats when exposed to five hours of sulfuring are blinded after the third hour, when they scamper about to escape the deadly fumes before they succumb. Invariably the dead rats are found with opaque lenses,—an evidence of blindness before death. Formerly three hours was the length of exposure to sulfur fumigation. The rats were rarely killed, but merely rendered stupid by the fumes and men with clubs killed them. Upon collecting these rats I found that the fleas soon revived and gave evidence of their activity when the containers were opened. It was concluded that three hours' exposure

was not sufficint to kill the parasites in this peculiar environment. It appeared that a blanket of pure air enveloped the rodent's body which the gas would not penetrate in the three hours of sulfuring. After these facts were established an exposure to five hours was the minimum time set. In an exposure to five hours this hypothetical layer of air surrounding the animal's body was presumably destroyed and the fleas exposed directly to the sulfur fumes. Endeavoring to escape, the fleas would jump about when the rats became blind and succumbed to the slowly penetrating sulfur fumes. Some were found on the floors of the holds and the comparatively few fleas found on the rat were asphyxiated in attempting to extricate themselves or jumped on the rat from the floor when the deadly fumes were becoming effective. Evidence of this was obtained in the fact that all the specimens collected from the rats were found clinging to the ends of the hairs.

When a vessel had received its fourth or fifth fumigation, providing the captain had observed the legal precautions (keeping the vessel fended off six feet and wearing rat guards on all her lines when alongside the docks) the rats aboard proved to be a negligible quantity. Efforts were taken under these circumstances to collect the fleas directly from the holds by means of fly-paper wound about the shoe tops of a person who walked through holds and between decks. This method proved ineffectual for trapping purposes, though it is followed with success when fleas are plentiful. The claim made—perhaps on unsubstantiated evidence—that live fleas invariably leave the dead body of a rat is considered untenable. I have found fifteen live fleas on the carcasses of forty black and brown rats. These had been cold for thirty-six hours, showing signs of decomposition. Dr. Hobdy, Chief Quarantine Officer of the United States Public Health and Marine Hospital Service, located a number of dead rats in a stable near the harbor. Four of these were examined by him and showed about sixty live fleas in the cervical region of each. These rats had been dead for at last forty-eight hours, infested as they were with half-grown larvae of blow flies. At the City Board of Health head-

quarters and the district plague sub-stations live fleas have been taken from numerous rats (as many as ninety-seven from a single rat) which had been dead from periods ranging from eighteen to sixty hours.

The British Indian Plague Commission has demonstrated beyond a doubt the method of rat flea plague transmission. Hundreds of plague rat fleas have been carefully dissected and their internal organs minutely inspected for any evidence of plague bacilli. The salivary glands, the theoretical centre of infection, were, after many painstaking attempts, successfully isolated from the body cavity. These were examined and a plague like organism was found within the secretory ducts. In addition, many fleas were crushed and inoculated into healthy animals. These latter, in every instance where the fleas had been removed from plague rats, succumbed to typical plague lesions. It was taken for granted upon experimental evidence that the transmission was due directly to the co-operation of the salivary glands in the action of the blood-sucking mandibles and epipharynx.

In a second series of experiments the commission attempted to test further the validity of this theory. Live fleas were removed from septicemic Plague Rats and placed in small vials covered with flea net gauze. A flea-clean healthy animal was selected and from a small area on the back the hair was shaved. The mouth of the vial was then placed against the smooth skin and the flea permitted to bite through the gauze, After biting, the insect was immediately withdrawn and the animal placed in a flea-proof cage and observed. A similar animal was taken and treated in an identical manner, but immediately on withdrawing the flea, after it had bitten, a platinum needle loopful of a plague flea's intestinal evacuation was rubbed into the bite. These experiments were duplicated and the results showed a marked uniformity. In no instance did the flea bite alone prove fatal, but in a large percentage the bites which were accompanied by the inoculation of the intestinal discharges caused a rapid death with post mortem plague positive verifications. It appears, then, that the disease trans-

mission from rat to man is due essentially to the introduction of the intestinal evacuations into the bite of the flea. It is the "rubbing it in" which is significant.

In the first experiments performed by the British Indian Plague Commission a technical oversight was suffered in their premature conclusions concerning the infectivity of the salivary glands. In this instance the investigators neglected to provide control measures. A bacteriological determination of the natural flora of the healthy flea's salivary glands should have been first obtained. I have isolated from the body cavity of this insect in the normal state numerous bipolar rod organisms resembling the plague bacilli.

Experimentally an insect like the *Stomoxys*, the stable fly, affords a good medium for transmission of *Bacillus pestis*. In the laboratory one can inoculate the stable fly by feeding plague cadaver. In this respect the flea is not a good subject, as it seems to prefer starvation to feeding on cadaverous tissue. By keeping the plague meat moist with sterile broth the fly is able to subsist for six to ten days. An examination of the proboscis and intestinal tracts of a fly thus nourished reveals innumerable plague-like organisms, proving also culturally positive. The *Stomoxys* which commonly bites man could transmit *Bacillus pestis* directly through the proboscis from the salivary glands. The intestinal discharges would be vastly greater in volume of bacterial content than even those of the flea, which is reputed to evacuate ten to one hundred thousand bacilli per cc. Consequently, the rubbing process in the case of the fly would have to be reckoned with. The question arises in what environment, in nature, would the flies be exposed to contamination by plague. We know that rats devour each other; that the weak and sick are at all times exposed to the attacks of the stronger. Thompson, Journal of Hygiene (1906, Vol. vi., 550) makes the statement that in Bombay at the Plague Laboratory more than eight per cent. of the rat carcases brought in had been devoured by their fellows, and sometimes so completely that nothing but head, paws, tail and skin remained. The cadavers of plague rats, as we have seen in San Francisco, are soon torn open, and the viscera exposed. Many of these have been found in harbor front stables covered with flies. The stable fly will feed on the plague tissue thus

presented when live tissue is not directly available. A bite from the fly after such infection would indeed prove disastrous.

Careful observers have noted in the history of an outbreak in its incipiency that it becomes effective in this wise: First, it is observed that an unusually large number of rats in a certain locality come out into the open and, acting queerly, unconscious of the presence of enemies, die in a short time. Then ensues a lull of several days, followed by the illness of the first human victims. It is during this lull in the history of a plague epidemic that there appears to exist an abnormal supply of rat fleas. This latter fact is amply illustrated from incidents in the San Francisco epidemic. In the early part of the campaign Dr. William Wherry, Bacteriologist of the San Francisco Health Department, collected one hundred and eighty fleas from two rats sent in from the Latin Quarter, a pest-ridden district. On four rats taken from Meigg's wharf in San Francisco there were counted approximately two hundred and forty fleas. Three of these rats were autopsied and one was found to have a pronounced case of plague, verified by Dr. Hobdy, U. S. A., clinically and bacteriologically. Under normal conditions and in districts removed from plague, the rats harbor an average of three or four fleas.

Observations were taken to determine whether rat fleas will bite the human. Baker states (Proc. U. S. Nat. Mus. '05) that rat fleas in America were never known to bite man. Since we know definitely how the plague is transmitted from rat to man it must be taken for granted at the outset that man has been rat flea bitten in many instances, as the San Francisco official plague records will show. Specific instances can be cited. In the improvised bacteriological laboratory of the San Francisco Health Department hundreds of dead and live rodents were brought daily. Fleas from these rats hopped freely about the floors and work tables, making things irritable for attendants and health officers. On shipboard nine specimens of rat fleas were collected preying on one of the surgeons in the United States Public Health Marine Hospital Service. My personal experiences contribute the fact that rat fleas taken directly from live rats or even rats which have been dead for several hours, will not bite the human until they have been permitted to starve in a test tube for two days or longer.

Notes on Tiger-Beetles and Elevations.

FRANKLIN SHERMAN, JR., Dept. Agric., Raleigh, N. C.

In company with Mr. C. S. Brimley, I spent the first two weeks of May this year (1908), in the southern part of the mountainous region of western North Carolina, for purposes of zoological exploration. This region contains some of the highest peaks and ranges of the entire Appalachian mountain system, and as it is near the southern terminus of the system, it furnishes an excellent field for observations on the effect of elevation upon distribution. During the trip the counties of Transylvania, Jackson, Macon and Cherokee were collected in to greater or lesser extent, the localities ranging from 2,000 to 4,300 feet elevation.

The season was undoubtedly too early for the best observations on some species of Tiger-beetles, but certain ones which were observed, especially *C. purpurea,* seemed to show such definite limits of distribution, that it seems worth while to place these observations on record.

Cicindela repanda.

Already recorded throughout all the western two-thirds of the state, and at various elevations, but is generally restricted to lighter-colored soils, gravels, sands, etc., in vicinity of streams. One specimen was taken along roadside on mountain at Andrews at about 2,500 feet elevation. The only water near was small rills, hardly large and deep enough for me to find opportunity to drink. At Lake Toxaway, 3,000 feet elevation, several specimens were taken along shores of lake.

Cicindela sexguttata.

The specimens collected on the trip may belong to the variety *harrisi.* The species was frequently taken, and still more frequently seen, at various elevations from 2,000 to 3,500 feet. At Andrews in Cherokee County it was a common species on the lower parts of a mountain road, being mingled at the higher elevations with *splendida* and *purpurea.* It was also common at an elevation of 2,500 to 3,000 feet along road from Highlands to Franklin, in Macon County, and was also taken at Blantyre, Transylvania County, and at Aquone, Macon County.

Cicindela vulgaris.

This species which is found throughout at least the greater part of the state occurs principally in early spring and in fall. Only one specimen was taken,—at Andrews, Cherokee County along a mountain road at about 2,500 feet elevation. This species is on record from so many parts of the state that it was not specially sought for or noticed on this trip. It was probably present at other places.

Cicinnela unipunctata.

This species has been recorded from our N. C. mountains before, but this was the first time I had ever taken it. Four specimens were taken at Andrews, at elevations ranging from 2,000 to 2,500 feet. In accordance with the observations of others we did not find it in hot, open, sunny places, but in shady corners, or where shade was close at hand. Possibly it does not usually become active until dusk.

Cicindela patruela.

Henshaw's check-list gives this as a variety of 6-*guttata,* but Leng, in his Revision, regards it as distinct. It averages larger than 6-*guttata,* has the middle band complete, and in this state is known only from the mountain region while 6-*guttata* has been taken in all sections. One specimen of *patruela* was taken at Blantyre, Transylvania County, at the very top of a mountain at about 3,000 feet elevation. I do not recall ever having taken this species at less than 2,000 or 2,500 feet, and I have come to consider it as a strictly mountain species in this state.

Cicindela splendida.

Henshaw lists this as one of the many varieties of *purpurea,* but Leng recognizes it as a distinct species, with which my observations agree, though the two may be connected by intermediate forms in other sections. *Splendida* averages smaller, is quite local in its distribution, is decidedly different in color, (the dorsum of prothorax being bright green, and not cupreous as in *purpurea*) is found (in this State) at lower elevations, and is in my experience a quicker, more wary species and harder to capture. Several were observed along the road from Highlands to Franklin in Macon County. But it was

on a road going up a mountain at Andrews that we found it most common. Here it was abundant between elevations of about 2,500 to 3,500 feet. At the lower part of this range it was mingled with about equal numbers of *sexguttata,* and at the higher elevations a few *purpurea* were found with it. My first specimens were taken in this same part of the State several years ago and I have come to regard it as mainly a mountain species, though I have taken it at two localities fully a hundred miles east of the mountains.

Cicindela purpurea.

Even before this trip, I had come to regard *purpurea* as one of the typically northern insects which ranges in our state only along the higher ridges. I first took it here (six years ago) at an elevation of about 4,000 feet, and it reminded me forcibly of western New York State where I first knew it. I have on other occasions taken it at other places in North Carolina but only at high, cool elevations. On this trip I took special note of its occurrence. It was taken at five different localities but in every case at elevations of not less (as best I could determine) than 3,000 feet. At Sapphire, (Jackson County) where the whole county is a plateau of about 3,000 feet elevation, it was found at ordinary levels. At Aquone, which is a much broken section it was found on ridges above the valleys at about 3,000 feet and upwards. At Blantyre, our only specimen was taken at about 3,000 feet on the top of the same mountain with our one specimen of *patruela.* In driving from Highlands to Franklin (Macon County) we traversed country ranging from 2,200 to 4,000 feet. *Purpurea* was encountered several times at the higher elevations but not seen at all at the lower levels. At Andrews in ascending a mountain road we found our first specimens at about 3,000 feet and it was found from there to the top at about 4,000 feet.

It is of course unsafe to draw sweeping conclusions from the casual observations of a few weeks, but my experience on this trip, as well as others before, leads me to believe that in our mountain section many interesting facts can be worked out in regard to the distribution of insects (of all kinds) at varying elevations.

The Occurrence of the Remarkable Braconid Genus Helorimorpha in America.

By Charles T. Brues, Public Museum, Milwaukee.

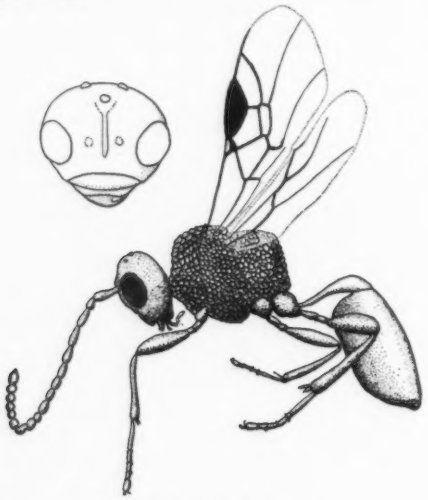
In 1907, Professor Otto Schmiedeknecht described a very peculiar little species of Braconidæ to which he gave the name *Helorimorpha egregia* (Hym. Mitteleuropas, Jena, 1907, p. 523). The genus was new to science and for its reception, its author established the subfamily Helorimorphinæ, which he placed between the Meteorinæ and Leiphroninæ in the scheme of classification adopted in that work. The single specimen upon which Prof. Schmiedeknecht based his description seems to have been the only one so far recorded, and I was therefore very much surprised recently to receive from my friend Professor A. L. Melander, a second specimen which represents a very distinct but closely allied species collected by him some years ago at Woods Hole, Massachusetts. Like its European congener, the American species is probably very rare, as the present specimen is the only one taken during several summers of active collecting in the vicinity, by both Professor Melander and myself.

It gives me great pleasure to dedicate the species to its discoverer, in remembrance of the many entomological excursions which we have taken together into the interesting territory surrounding Woods Hole.

Helorimorpha melanderi sp. nov.

Female.—Length 4 mm. Honey-yellow; the head, except mouthparts, and the antennal flagellum black. Head seen from above, transverse, two and one-half times as wide as thick, and full behind the eyes. Eyes small, nearly circular, no longer than the large, broad cheeks. Front strongly excavated on each side above the insertion of the antennæ, the depressions separated by a strong median carina which extends from below the base of the antennæ nearly to the median ocellus. Ocelli small, placed in a small equilateral triangle which is distinctly raised and bordered by a raised line. Head margined behind on the occiput, temples and cheeks. Clypeus transverse, elliptic, very broadly and slightly emarginate anteriorly; mandibles long, acute, apparently with a broad tooth some distance before the tip. Surface of head faintly punctulate above, very closely so below, clypeus sparsely punctate, cheeks, temples and occiput smooth and polished. Antennæ 18-jointed; scape as long as the first flagellar joint, pedicel small, subglobose; flagellar joints gradually shortening to the ninth which is ovoid, following moniliform. Maxillary palpi 4-jointed. Entire thorax, including pleura, reticulated or coarsely pitted with large, almost confluent thimble-shaped punctures. Metathorax short, abruptly declivous behind; longitudinally concave on the posterior slope. Abdomen smooth and highly polished, inserted very low down between the hind coxæ, its petiole long and slender, curved and dilated at the tip as in some males of the Cryptinæ, with a few delicate striæ at the base. Remainder

of abdomen narrowly ovate, second segment concealing all the others, the ovipositor barely projecting beyond its tip. Legs rather stout, all the femora and the posterior tibiæ clavate, tips of posterior tibiæ and their tarsi black; posterior tibiæ with two short, subequal spurs. Wings hyaline, with dark stigma and pale venation. Stigma large and broadly ovate, as long as the marginal cell. Radial vein bent at a right angle, its second section regularly arcuate. First transverse cubitus as long as the first section of the cubitus, second very short, almost interstitial with the first section of the radius; submedian cell a little longer than the median, second cubital cell two and one-half times as long as wide.



Helorimorpha melanderi sp. nov.

Described from one female, Woods Hole, Mass. (A. L. Melander) July 21, 1902.

The present species differs from *H. egregia* Schmied. by its honey-yellow thorax and abdomen, and more strongly clavate abdominal petiole. The abdomen is also less distinctly truncate and the wing venation slightly different.

The genus *Helorimorpha* is the representative of a truly remarkable group and reminds one strongly of certain Euphorinæ, except for the well developed wing venation, longer second abdominal segment, and more distinctly moniliform antennæ. I cannot but think that it must be an archaic form related to the stock from which the modern Euphorinæ have developed. In fact, I have a typical member of the Euphorinæ, probably representing an undescribed genus with an abdomen almost exactly like that of *Helorimorpha*.

Upon the Aphis-Feeding Species of Aphelinus.

By L. O. Howard.

Down to a comparatively recent date, the only Chalcidoid of the subfamily Aphelininae known to parasitize Aphididae was *Aphelinus mali* Hald., described by Haldeman in the Proceedings of the Boston Society of Natural History, Volume VI, 1860, pages 402-403, under the name of *Eriophilus mali*. It was reared by Haldeman from *Schizoneura* (*Eriosoma*) *lanigera*, and is referred to under this name by Comstock in his Report as Entomologist for the United States Department of Agriculture for 1879, and is figured at Plate VI, figure 6, from specimens reared by the writer from *Schizoneura lanigera* occurring upon apple upon the grounds of the Department of Agriculture at Washington. The species had apparently also been reared from the same host by Walsh in Illinois and by Riley in Missouri. Since then it has been found to be a rather general parasite of Aphididae, and the following records occur in the writer's Revision of the Aphelininae of North America (Technical Series No. 1, Division of Entomology, U. S. Department of Agriculture, 1895) where it was placed in its proper genus, *Aphelinus;* by F. M. Webster from *Glyphina eragrostidis* at Lafayette, Indiana, September 6 to 10, 1885; by the same observer from *Aphis brassicae* on turnip; by T. A. Williams, at Lincoln, Nebr., from *Pemphigus fraxinifolii*, June 10, 1890; by the same observer from *Aphis monardae* at Ashland, Nebraska, May 24th, 1890, and by W. H. Ashmead from *Siphonophora rosae* at Jacksonville, Fla., in April, 1881 (described by Doctor Ashmead as *Blastothrix rosae*, unfortunately placing it in the wrong family). Still later and as yet unrecorded rearings of this interesting species have been made by Zehntner from *Aphis sacchari* at Pasoroean, Java, and in the insectary at Washington by Pergande from *Tetraneura colophoidea*, November 7, 1897, from Cabin Johns Bridge, Maryland. The species seems, therefore, to be not only a very general parasite of Aphididae, but also seems to be of wide distribution.

Aphelinus mali was at once set off from the other species

of *Aphelinus,* with one exception, by the possession of hairy eyes, and this character, taken in connection with its different host relation, has suggested the advisability of erecting a new genus to contain it and the allied forms that have since been discovered. It also differs in its black color from the Coccid-inhabiting species. A single individual of an *Aphelinus* having hairy eyes and being black except for the head and extremities of the abdomen was collected by Koebele in the Santa Cruz Mountains, California, and has been described by the author (Technical Series No. 1) as *A. flaviceps,* the statement being made at the same time that the species would probably ultimately be found to be parasitic upon some Aphidid, this conclusion being reached from the prevalence of the dark color and from the possession of hairy eyes. *A. flaviceps,* however, has never since been reared, and the accuracy of this theoretical suggestion has not been proved or disproved. Comparatively recently however two additional species have been reared from Aphididae, which are also characterized by the possession of a preponderance of black in the coloration and by eyes that are hairy. These species, *A. semiflavus* n. sp. and *A. nigritus* n. sp. are described below.

TABLE SEPARATING THE APHELINUS PARASITES OF APHIDIDAE.

Females.

Eyes obviously hairy.

Head black, base of abdomen yellow, hind femora pallid . **mali** Hald.

Head yellow, abdomen yellow at base and tip, all legs orange-yellow . . . . . **flaviceps** How.

Head and abdomen entirely black . . . . . **nigritus** n. sp.

Eyes obscurely hairy.

Abdomen light yellowish, darker at margins, all legs yellowish or slightly dusky . . . . . **semiflavus** n. sp.

Males.

Third funicle joint twice as long as pedicel and six times as long as broad; club one-fourth longer than third funicle joint **semiflavus** n. sp.

Third funicle joint very slightly longer than pedicel, and slightly more than three times as long as broad; club rather more than twice as long as third funicle joint . . . . . **mali** Hald.

Aphelinus semiflavus n. sp.

Female.—Length 1.08 mm.; expanse 1.87 mm.; greatest width of fore wing 0.3 mm. Antennæ short, excluding scape about the length of face; pedicel long, more than three times as long as wide; funicle joints 1 and 2 subequal in length and width and each slightly less than one-third length of pedicel; joint 3 two-thirds length of pedicel and about as wide as its tip; club slightly swollen, ellipsoidal, and about twice the length of pedicel. Eyes faintly hairy. General color black; thorax smooth, shining, scape and pedicel dusky, flagellum pallid, club becoming somewhat dusky at tip; front and middle femora and all tibiæ somewhat dusky; hind femora straw yellow. Abdomen light yellow shaded around margin with brownish. Wings rather short, otherwise normal.

Male.—Length 0.85 mm.; expanse 1.58 mm.; greatest width of fore wing 0.204 mm. Differs from female in having antennæ nearly uniform brown, scape slightly darker, and in the proportions of third funicle joint and club. Third joint cylindrical, twice as long as pedicel and six times as long as broad; club one-quarter longer than third funicle joint, elongate ovate in shape.

Described from 14 ♂ ♀ specimens reared by C. P. Gillette, Fort Collins, Colo., July 15, 19, 1908, from *Myzus persicae,* and reared at Washington from the same host sent in by Professor Gillette. The parasitized host turns black.

U. S. N. M. type No. 12031.

Aphelinus nigritus n. sp.

Female.—Lenth, 0.68 mm.; expanse, 1.7 mm.; greatest width of fore wing, 0.26 mm. Flagellum of antennæ short, not as long as face; pedicel obconical, about twice as long as wide; first and second funicle joints very short, together less than half as long as pedicel; third funicle joint about as long as thick, and about as long as, or slightly shorter than pedicel; club about three times as long as third funicle joint, about twice as long as broad, obliquely truncate at tip. Body uniformly black, shining. Mesoscutum, including parapsides, with faint, sparse, small, irregular punctures. All legs and antennæ pale yellow except for a duskiness of the hind tibiæ and the tip of the antennal club.

Male.—Unknown.

Described from six ♀ specimens reared by G. G. Ainslie, Bureau of Entomology, Spartanburg, S. C., from *Toxoptera graminum.*

U. S. N. M. type No. 12032.

An Interesting new Agrilus from Cincinnati, Ohio.

By Charles Dury.

Agrilus ferrisi n. sp.

Color, shining cupreous. Head coarsely, strigosely punctured. Antennae serrate from the fourth joint. Front densely pubescent with white hairs, and with a deep median groove. Prothorax slightly broader than long. Sides almost parallel, rounded at front angles and sinuate in front of obtuse hind angles, which are carinate in both sexes. Disk coarsely punctured and strigose, with a dense patch of white pubescence each side, extending from base to apex. Scutellum transversely carinate. Elytra costate from humeri nearly to tip. Sides slightly sinuate behind the humeri and dilated behind the middle, thence tapering to tip, which is serrulate and prolonged into an acute spine. The surface of elytra is muricately punctured and transversely wrinkled. The elytra project beyond the tip of last abdominal segment in both sexes. The pygidium is not carinate. Beneath, the entire thorax, sides of meso- and metasterna, and a large patch on the sides of each ventral segment, densely white pubescent. Claws bifid. The sexual organs are very peculiar. The male organ is composed of three pieces, the middle one being longest and bluntly pointed at tip. The shorter side pieces are acute at tip, and with a fringe of long hairs each side. There is a channel down the centre of the tip of the middle piece. The tip of last ventral segment is bluntly rounded and has a deep groove running around it near the edge. In the female the last segment is squarely truncate, and the projecting ovipositor is tapering and emarginate each side, and squarely truncate at tip. The segment has a feeble longitudinal carina at middle and a curved groove each side. Length, 10-11 mm.

Fifteen specimens. Beaten only from Hackberry *Celtis occidentalis*. Cincinnati, Ohio, June 7 to July 2. This species leads to a large group of forms found in Mexico and Central America, in which the elytral apices are prolonged and otherwise curiously modified in various ways. I am unable to find anything like it described in the Biologia, or Dr. Horn's paper, Trans. Amer. Ent. Soc., xviii, p. 277.

Named in honor of Miss Phœbe Ferris, in whose woods I found all of the specimens. During her lifetime she was a devoted lover of our virgin forests, and realized the importance of their preservation. A specimen deposited in U. S. Nat. Museum.

A list of Local Lepidoptera found at Decorah, Iowa.

By A. F. Porter.

RHOPALOCERA.

14 *Papilio thoas.*
11 " *turnus.*
22 " *polyxenes.*
37 *Pontia protodice.*
36 " *occidentalis.* ..
40 " *rapae.*
60 *Zerene eurydice.*
61 " *caesonia.*
61 " *rosa.*
65 *Eurymus eurytheme.*
65 " *ariadne.*
65 " *eriphyle.*
66 " *philodice.*
" *albino.*
83 *Eurema nicippe.*
85 " *euterpe.*
85 " *alba.*
92 *Euptoieta claudia.*
95 *Speyeria idalia.*
99 *Argynnis cybele.*
100 " *aphrodite.*
100 " *alcestis.*
102 " *atlantis.*
131 *Brenthis myrina.*
141 " *bellona.*
185 *Charidryas nycteis.*
186 " *ismeria.*
189 *Phyciodes tharos.*
205 *Polygonia interrogationis.*
205 " *umbrosa.*
206 " *comma.*
206 " *dryas.*
209 " *faunus.*
214 " *progne.*
215 *Eugonia j-album.*
217 *Euvanessa antiopa.*
219 *Vanessa atalanta.*
220 " *huntera.*
221 " *cardui.*
223 *Junonia coenia.*
236 *Basilarchia astyanax.*
237 " *arthemis.*
239 " *archippus.*
244 *Chlorippe celtis.*
248 " *clyton.*
258 *Cercyonis alope.*
258 " *nephele.*
286 *Enodia portlandia.*
299 *Cissia eurytus.*
308 *Anosia plexippus.*
311 *Hypatus bachmani.*
347 *Thecla calanus.*
384 *Strymon titus.*
Feniseca tarquinius.
390 *Gaeides dione.*
393 *Chrysophanus thoe.*
399 *Hcodes hypophleas.*
440 *Cyaniris ladon.*
440 " *marginata.*
442 *Everes comyntas.*
484 *Atrytone hobomok.*
512 *Hylephila campestris.*
516 *Thymelicus brettus.*
523 " *cernes.*
526 *Polites peckius.*
528 *Euphyes verna.*
584 *Epargyreus tityrus.*
601 *Thorybes pylades.*
605 *Pholisora catullus.*
625 *Thanaos juvenalis.*
617 " *brizo.*
642 *Hesperia tessellata.*
643 " *montivagus.*

HETEROCERA.

653 *Hemaris diffinis.*
656 " *thysbe.*
667 *Amphion nessus.*
670 *Deilephila gallii.*
671 " *lineata.*

672 *Theretra tersa.*
678 *Pholus pandorus.*
679 " *achemon.*
681 *Ampelophaga choerilus.*
682 " *myron.*
686 *Dilophonta ello.*
696 *Phlegethontius quinquemaculata.*
697 " *sexta.*
700 *Sphinx kalmiae.*
701 " *drupiferarum.*
706 " *chersis.*
713 " *canadensis.*
716 " *eremitus.*
720 *Chlaenogramma jasmineearum.*
721 *Ceratomia amyntor.*
722 " *undulosa.*
728 *Marumba modesta.*
729 *Smerinthus jamaicensis.*
731 *Paonias excaecatus.*
732 " *myops.*
734 *Cressonia juglandis.*
739 *Samia cecropia.*
747 *Tropaea luna.*
748 *Telea polyphemus.*
753 *Automeris io.*
2806 *Catocala epione.*
2865 " *ilia.*
2826 " *relicta.*
2827 " *cara.*
2828 " *nurus.*
2831 " *californica.*
2890 " *whitneyi.*
2864 " *celia.*
2907 " *lineella.*
2877 " *desdemona.*
2892 " *crataegi.*
2851 " *mariana.*
2854 " *briseis.*
2857 " *parta.*
2830 " *concumbens.*
2848 " *unijuga.*
2902 " *grynea.*
2872 " *cerogama.*
2868 " *piatrix.*
2900 " *praeclara.*
2907 *Catocala nerissa.*
2911 *Euparthenos nubilis.*
874 *Apantesis virgo.*
892 " *figurata.*
882 " *arge.*
879 " *rectilinea.*
875 " *virguncula.*
895 " *vittata.*
878 " *parthenice.*
895 " *phalerata.*
3226 *Oreta rosea.*
3123 *Nadata gibbosa.*
3124 *Nerice bidentata.*
771 *Anisota rubicunda.*
767 " *stigma.*
770 " *virginiensis.*
4008 *Caberodes majoraria.*
3214 *Malacosoma americana.*
3090 *Apatelodes torrefacta.*
2448 *Stiria rugifrons.*
1053 *Harrisimemna trisignata.*
2986 *Homoptera lunata.*
2986 " *edusa.*
851 *Estigmene acraea.*
840 *Haploa lecontei.*
840 " *militaris.*
842 " *contigua.*
3180 *Euthyatira pudens.*
3922 *Ennomos subsignarius.*
3923 " *magnarius.*
3229 *Drepana genicula.*
972 *Apatela americana.*
984 " *lepusculina.*
1031 " *impressa.*
1041 " *oblinita.*
1037 " *xyliniformis.*
991 " *interrupta.*
1002 " *clarescens.*
993 " *lobeliae.*
859 *Isia isabella.*
2487 *Autographa rogationis.*
2519 " *simplex.*
2207 *Scoliopteryx libatrix.*
1774 *Mamestra imbrifera.*
1800 " *grandis.*
1807 " *picta.*
1822 " *ligitima.*

1837 *Mamestra laudabilis.*
1842 " *lorea.*
1845 " *anguina.*
1812 " *adjuncta.*
1721 *Paragrotis furtivus.*
" *redimicula.*
1698 *Porosagrotis retusta.*
3096 *Melalopha albosigma.*
4336 *Evergestis straminalis.*
4307 *Pantographa limata.*
3248 *Eudule mendica.*
3262 *Heterophleps triguttaria.*
1235 *Hadena arctica.*
1250 " *lignicolor.*
1232 " *devastatrix.*
1149 " *bridghami.*
1166 " *mactata.*
1227 " *dubitans.*
1241 " *verbascoides.*
919 *Halisidota tessellaris.*
922 " *maculata.*
798 *Ctenucha virginica.*
914 *Euchaetias antica.*
911 " *oregonensis.*
912 " *pudens.*
808 *Hypoprepia fucosa.*
3925 *Xanthotype crocataria.*
2428 *Euthisanotia unio.*
2656 *Chamyris cerintha.*
4513 *Hypsopygia costalis.*
3332 *Euchoeca albovittata.*
2755 *Drasteria crassiuscula.*
3867 *Lycia cognataria.*
4059 *Cicinnus melsheimeri.*
4417 *Pyrausta pertextalis.*
3354 *Eustroma atrocoloratum.*
3352 " *prunata.*
3349 " *testata.*
3232 *Dyspteris arbortivaria.*
3223 *Epicnaptera americana.*
3388 *Hydriomena autumnalis.*
4277 *Desmia funeralis.*
860 *Phragmatobia fuliginosa.*
834 *Eubaphe brevicornis.*
832 " *opella.*
3080 *Hypena humuli.*
2310 *Rhodosea julia.*
2921 *Parallelia bistriaris.*
1540 *Feltia herilis.*
1538 " *subgothica.*
1544 " *gladiaria.*
1549 " *volubilis.*
3294 *Tephroclystis absinthiata.*
2613 *Eustrotia carneola.*
1963 *Heliophila albilinea.*
1979 " *commoides.*
1954 " *pseudargyria.*
1953 " *unipuncta.*
3120 *Lophodonta ferruginea.*
3121 " *angulosa.*
1295 *Pyrophila pyramidoides.*
3327 *Eucymatoge intestinata.*
3173 *Habrosyne scripta.*
3971 *Euchlaena kentaria.*
4516 *Pyralis farinalis.*
3208 *Tolype velleda.*
2469 *Panchrysia purpurigera.*
3934 *Hyperitis nepiasaria.*
3468 *Haematopsis grataria.*
2078 *Xylina disposita.*
2095 " *innominata.*
3664 *Sciagraphia mellistrigata.*
3931 *Plagodis phlogosaria.*
3929 " *fervidaria.*
787 *Scepsis fulvicollis.*
2300 *Heliothis armiger.*
1370 *Adita chionanthi.*
2206 *Eucirroedia pampina.*
862 *Diacrisia virginica.*
1464 *Peridroma astricta.*
3117 *Notodonta simplaria.*
2945 *Phurys perspicua.*
1454 *Agrotis ypsilon.*
1455 " *geniculata.*
2179 *Papaipema nitela.*
2183 " *cerussata.*
2187 " *cataphracta.*
2190 " *rutila.*
2230 *Orthosia helva.*
2222 " *bicolorago.*
2536 *Abrostola urentis.*
3916 *Eugonobapta nivosaria.*
3850 *Cleora pampinaria.*
1267 *Polia diversilineata.*

3487 *Synelys ennucleata.*
3881 *Phigalia titea.*
3245 *Paleacrita vernata.*
4016 *Sabulodes lorata.*
4011 *Tetracis crocallata.*
3986 *Metanema quercivoraria.*
3913 *Metrocampa praegrandaria.*
4007 *Caberodes confusaria.*
3956 *Euchlaena obtusaria.*
3957 " *effectaria.*
3964 " *marginata.*
3960 " *johnsonaria.*
3886 *Cingilia catenaria.*
792 *Lycomorpha pholus.*
2149 *Sphida obliqua.*
2204 *Trigonophora periculosa.*
1054 *Microcoelia dipteroides.*
2197 *Pyrrhia umbra.*
2920 *Panapoda rufimargo.*
2979 *Pheocyma lunifera.*
2915 *Phoberia atomaris.*
2760 *Euclidia cuspidea.*
836 *Utetheisa bella.*
2131 *Cucullia speyeri.*
957 *Panthea furcilla.*
1422 *Eueretagrotis sigmoides.*
2165 *Gortyna immanis.*
2161 " *velata.*
2162 " *nictitans.*
2060 *Tricholita signata.*
1297 *Heliotropha atra.*
2456 *Plagiomimicus pityochromus.*
968 *Raphia frater.*
2328 *Schinia cumatilis.*
1300 *Prodenia ornithogalli.*
2551 *Marasmalus inficita.*
4208 *Sesia tipuliformis.*
2389 *Dasyspondaea lucens.*
1289 *Trachea delicata.*
3177 *Pseudothyatira expultrix.*
1087 *Crambodes talidiformis.*
2618 *Galgula partita.*
2044 *Graphiphora garmani.*
2015 " *oviducta.*
3065 *Bomolocha baltimoralis.*
2556 *Anomis erosa.*
1921 *Ulolonche modesta.*
1481 *Noctua c-nigrum.*
1496 " *clandestina.*
1491 " *collaris.*
3100 *Datana angusii.*
3098 " *ministra.*
3106 " *perspicua.*
3108 " *integerrima.*
3118 *Pheosia dimidiata.*
3092 *Melalopha apicalis.*
3096 " *albosigma.*
3095 " *strigosa.*
3111 *Hyperaeschra stragula.*
3148 *Schizura ipomoeae.*
3151 " *unicornis.*
3150 " *semirufescens.*
3153 " *badia.*
3149 " *concinna.*
3133 *Heterocampa obliqua.*
3136 " *umbrata.*
3137 " *manteo.*
3138 " *subrotata.*
1290 *Dipterygia scabuscula.*
1375 *Eutolype rolandi.*
1885 *Morrisonia sectilis.*
1885 " *vomerina.*
2261 *Ipimorpha pleonectusa.*
3145 *Ianassa lignicolor.*
3164 *Harpyia scolopendrina.*
3162 " *cinerea.*
3160 *Cerura occidentalis.*
4142 *Cossus centerensis.*
3438 *Gypsochroa designata.*
1049 *Arsilonche albovenosa.*

NOTE.—Names are taken from H. G. Dyar's "List of North American Lepidoptera," and the numbers preceding specific names correspond to those in the above mentioned work. I should be pleased to receive exchange lists from all parties desiring any of the species on this list.

Colorado Bembicidae.

By S. A. Johnson and S. A. Rohwer.

The main object of this paper is to give the distribution, within the State, of the species which are known to occur here, and to add a few species which have hitherto not been reported. The notes are based principally on the collection of the Colorado Agricultural College, but a few species have been taken by the junior author.

To make the paper more complete, tables to separate the genera and species are offered.

The family may be separated into two distinct subfamilies as follows:

Middle tibiæ with two spurs at apex; ocelli normal, round. . . Stizinæ.
Middle tibiæ with one spur at apex; ocelli more or less abnormal, especially the anterior one . . . . . Bembecinæ.

Stizinæ.

Marginal cell much longer than the first cubital; species large. **Sphecius** Dahlb.
Marginal cell much shorter than the first cubital; both large and small species . . . . . **Stizus** Latr.

SPHECIUS Dahlb.

This is a small genus, containing but four species in the United States. These are all southern forms. There is but one species known from Colorado, *S. speciosus* Drury. We have two females and a male from Las Animas, Col., August 17, 1901. The thorax is rufous.

STIZUS Latr.

Species large; metathorax not emarginate posteriorly (*Megastizus*). . 1.
Species smaller, about 10 mm.; metathorax emarginate posteriorly (*Stizus*) . . . . . 2.

1. Wings mostly blue-black; first and second transverse cubiti meeting, or nearly so, on the radial; second dorsal abdominal segment with a rufous band, other segments black. . . **unicinctus** Say.
   Wings hyaline; first and second transverse cubiti distinctly separated on radial; abdomen with many pale spots or bands. **brevipennis** Walsh.
2. Black, with pale markings . . . . . **godmani** Cam.
   Yellow, with a few black markings . . . . . **subalpinus** Ckll.

Stizus (*Megastizus*) **unicinctus** Say.

We have not seen this species. It is recorded from Colorado by Cresson (cat.), and Ashmead (Colo. list).

Stizus (*Megastizus*) **brevipennis** Walsh.

We have a male of this species from Ft. Lupton, Colorado, July 22, 1900.

Stizus (*Stizus*) **subalpinus** Ckll.

This was described as a variety of *flavus* Cam., but inasmuch as all the northern ones are as pale as *subalpinus*, it may be called a species, Two males, Ft. Collins, Col,, Aug. 7, 1904.

Stizus (*Stizus*) **godmani** Cam.

Two males, Boulder, Col. Aug. 30, 1907, fls. of *Helianthus pumilis* (Roh.). This species is common at Las Cruces, New Mexico. We have seen many specimens collected by C. H. T. Townsend from flowers of *Solidago canadensis*.

BEMBICINÆ.

Mandibles simple; maxillary palpi 3-jointed, labial palpi 1-jointed; species about 10 mm. long . . . . . **Microbembex** Patt.
Mandibles armed with a tooth; species longer than 10 mm. . . . . 1.
1. Metathorax emarginate posteriorly . . . . . **Bembidula** Burm.
Metathorax not emarginate posteriorly, flat or convex . . . . . 2.
2. Anterior ocellus linear; maxillary palpi 4-jointed, labial palpi 2-jointed. **Bembex** Fabr.
Anterior ocellus round or elliptic; palpi otherwise . . . . . 3.
3. Maxilla long, reaching hind coxæ; maxillary palpi 3-jointed, labial palpi 1-jointed; anterior ocellus elliptic . . . . **Steniolia** Say.
Maxilla short; maxillary palpi 6-jointed, labial palpi 4-jointed; anterior ocellus round or reniform . . . . . **Stictia** Illiger.

MICROBEMBEX Patt.

This genus is quite distinct. There is apparently but one species known, but it has at least five distinct forms, some of which may at a later time be raised to specific value. They may be separated as follows:

Clypeus and labrum mostly black . . . . . 1.
Clypeus and labrum entirely yellow . . . . . 2.
1. Posterior face of metathorax with a large pale spot on each side; a large pale spot on pleura; two pale parallel lines on middle of mesonotum . . . . . **monodonta occidentalis.**

Posterior face of metathorax without a pale spot on each side, or with a very small one; spot on pleura small or wanting; no lines on the mesonotum . . . . . **monodonta.**

2. Venter black, except a small spot on each side of second and third segments; band on first abdominal segment dentate in middle; markings greenish or pale yellowish. **monodonta neomexicana.**

Venter with much more yellow . . . . . 3.

3. Mandibles black; scape entirely black; pectus not margined with yellow . . . . . **monodonta deltaensis.**

Mandibles yellow; scape in front yellow; pectus margined with yellow . . . . . **monodonta argentifrons.**

Microbembex monodonta monodonta Say.

This subspecies seems to be eastern. The female described by Patton (p. 362, v, Bull. U. S. Geol. Survey) was from Connecticut. We have a male and female from New Jersey. The mark on the pleura is wanting in both of these. Patton (loc. cit., p. 363) describes the specimens from Kansas as differing from the eastern ones in much the same way as *occidentalis* differs from *monodonta*.

Microbembex monodonta occidentalis subsp. n.

The characters in the above table will separate this subspecies from *monodonta monodonta* its nearest ally. The markings in all the specimens before us are greenish. The silvery pile is usually quite dense. We have specimens from Paris, Tex. (C. R. Jones), and Colo.

Microbembex monodonta neomexicana subsp. n.

This subspecies seems quite distinct. The dentation of the first abdominal band, the mostly black venter, the yellow clypeus and labrum make it easily recognized. The markings vary from greenish-white to pale yellow. On the average it is smaller than the two preceding subspecies. Many specimens from Las Cruces New Mexico, August 30th, at flowers of *Solidago canadensis* (C. H. T. Townsend).

Microbembex monodonta deltaensis subsp. n.

The table will separate this from the other subspecies. The markings are lemon-yellow. The sides of the venter beyond the second segment, and the second ventral segment except

the spine are yellow. The abdomen above is mostly yellow. The pale markings on the head and thorax are large. Length 10 mm. Many male specimens from Delta, Colo., July 29, 1898.

Microbembex monodonta argentifrons Cress.

This subspecies was described as a distinct species from Cuba by Mr. Cresson.

BEMBIDULA Burm.

This genus is not well represented in Colorado, there being but two species, but an apparently new one is added here. It is from New Mexico. The table is based on the males.

Larger (about 18 mm.); postscutellum black; spots on the abdominal segments much wider at the sides, spots eight in number, growing smaller towards apex . . . . . **quadrifasciata** Say.

Smaller (about 14 mm.); postscutellum marked with yellow; spots of abdomen not or but little wider at the sides, spot on all the segments narrowly separated in the middle . . . . . 1.

1. Clypeus black; punctures of dorsulum close; tibiae with a black stripe; bands on abdomen rather narrow . . . **ventralis** Say.

Clypeus with a large pale spot; punctures of dorsulum larger and more separated; tibiae entirely pale; bands on the abdomen broader . . . . . **meliloti** Roh., n. sp.

Bembidula ventralis Say.

Female, Cope, Colo., Aug. 19, 1905 (S. A. Johnson).

Bembidula quadrifasciata Say.

Female without a label, but probably from Ft. Collins, Colo., having been picked up by a student.

Bembidula meliloti Roh., n. sp.—♂. Length about 14 mm.; clypeus finely closely punctured, along the anterior margin are a few larger punctures; mandibles with two rather small teeth within; front punctured similar to clypeus; first joint of the flagellum a little longer than 2 + 3; apical joints slightly produced beneath; apical joint obliquely truncate; dorsulum punctured with rather large punctures, which are separated (not widely so, however) on the posterior part, the anterior part and near tegulæ they are closer; scutellum punctured like posterior part of dorsulum, if anything, more sparsely so; mesopleura with large, separate punctures; metathorax sculptured like scutellum, or perhaps the punctures are a little closer; angles broadly, obtusely rounded; first joint of anterior tarsi emarginate at base beneath; middle femora with a strong, stout spine at base beneath; abdomen distinctly reticulate, apical

segment with large, strong punctures; spines long, obtusely pointed, lateral ones curved; stipes of the genitalia broad, somewhat the shape of a knife-blade, but not very sharply pointed; at apex and sides with a strong fringe of hairs; ventral segments beyond first with some large punctures among the close fine ones. Black; spot on base of mandibles, large transverse, irregular spots on clypeus, inner orbits for two-thirds of the way above clypeus, narrow line on lower two-third of posterior orbits, palpi, line on pronotum, tubercles, tegulae, a line above, spot on each side of scutellum, line on postscutellum, angles of metathorax, legs below about the middle of femora, broad bands on dorsal abdominal segments 1–6, usually narrowly interrupted in middle, small spot on each side of seventh dorsal segment, spots on sides of ventral segments 2–5, *yellow* or *greenish-white:* the color of the legs is bright yellow, the other markings are more or less greenish; stripes of genitalia reddish-yellow; wings yellowish hyaline, nervures brown; head and thorax with white pubescence, that on the head the longest; in one wing the second tr. cu. is wanting.

Hab.—Pecos, New Mexico, Sept. 2nd, at fls. of *Melilotus alba* (Ckll.).

This species is close to *B. ventralis* Say, but may be known from it by the characters given in the above table, and in having the first joint of anterior tarsi emarginate at base beneath.

BEMBEX Fabr.

Males.

Prominence of sixth ventral segment bifid at apex . . . . . **amoena** Hdl.
Prominence of sixth ventral segment simple at apex . . . . . 1.
1. Dorsulum spotted . . . . . **sayi** Cress.
Dorsulum not spotted, or at least not notably so . . . . . 2.
2. Markings of abdomen bright yellow; femora yellow, except base sometimes; larger (20 mm.) . . . . . **nubilipennis** Cress.
Markings of abdomen greenish-white; femora largely black; smaller. **spinolae** St. Farg.

Females.

Metathorax with a good deal of yellow; larger . . . . . 1.
Metathorax black, or with a little yellow; smaller . . . . . 2.
1. Wings at base clouded . . . . . **nubilipennis** Cress.
Wings hyaline . . . . . **sayi** Cress.
2. Pleura black, without spots; bands of abdomen continuous. **spinolae** St. Farg.
Pleura spotted . . . . . 3.
3. Bands of abdomen separated; mesopleura with two spots. **amoena** Hdl.
Bands of abdomen continuous; mesopleura with one large spot . . 4.

4. Length 20 mm.; abdomen hardly pubescent (Utah) . . **connexus** Fox.
Length 14 mm.; abdomen distinctly pubescent . . **primaaestate** n. sp.

Bembex nubilipennis Cress.

Male, Rocky Ford, Colo., July 4, 1904; female, labeled "F. F. C."

Bembex sayi Cress.

Female, Salida, Colo., Oct. 3, 1898; 2 females, Cope, Colo., Aug. 9, 1905 (S. A. Johnson).

Bembex amoena Hdl.

Male, Alamosa, Colo., Aug. 6, 1903; male, Rocky Ford, Colo., July 4, 1904.

Bembex spinolae St. Farg.

Two females, Pueblo, Colo., Aug. 10, 1907 (Hite); female, Sept. 12, 1907, fls. *Chrysothamnus graveolens*, also Oct., 6, 1907, Boulder, Colo. (Roh.). The Boulder ones have a very small spot below tegulae.

Bembex primaaestate John. and Roh., n. sp.—♀. Length 14 mm.; clypeus rather irregularly punctured with shallow punctures; mandibles with a small tooth, about one-fourth from apex; front impunctate, or if punctured, very finely so; ocellar region with some distinct punctures; vertex and occiput straight; scape and first flagellar joint of about equal length, first joint of flagellum fully as long as 2 + 3; dorsulum with rather indistinct, close punctures, sparse on posterior part; scutellum with punctures more distinct and separated; mesopleura finely punctured; metathorax punctured as scutellum; anterior tarsi strongly flattened, base of first joint emarginate beneath; pulvilli large and somewhat bent toward apex; abdomen above rather strongly reticulate, apical segments punctured; ventral segments finely reticulate, with some large punctures. Black; clypeus, labrum, mandibles, except apex, which is piceous, scape and flagellum beneath, inner orbits to ocelli, intercellular spot, spot between antennae, a large spot on each side of first abdominal segment above, segments 2-5 with broad bands, which are dentate at the sides (second and third more strongly so), and spot on ventral segments 2, 3, 4, *greenish-white;* posterior orbits, prothorax except a spot in the middle, tegulae, spot above, a spot on each side of scutellum, line on postscutellum, large spot on mesopleura, spot above middle coxae, a large and small spot on metapleura, spot on trochanters, most of femora (more deeply so at sides), tibiae except a small spot beneath at apex, and tarsi, *bright yellow;* wings clear hyaline iridescent; head, thorax and abdomen with long white pile.

Hab.—Denver, Colo., 1889 (S. A. Johnson).

This species runs in Fox's table (Proc. Acad. Nat. Sci. Phil., 1895, p. 354) to *B. connexus* Fox, but it is not that species. It probably is more closely related to *B. spinolae* or *B. amoena*, but may be separated from these species by the foregoing table.

STENIOLIA Say.

Middle tibiae and tarsi simple ; markings bright yellowish. **duplicata** Prov.

Middle tibiae and tarsi dilated ; markings greenish-white . **obliqua** Cress.

Steniolia duplicata Prov.

Two females, Cortez, Col., Aug. 10, 1903 ; female, Boulder, Col., Sept. 7, 1907 (Roh.). We have also seen this species from Las Cruces, New Mexico, Aug. 30th, at fls. of *Solidago canadensis* (Townsend). This species has so far only been found on the plains. It is probably a southern form, finding its northern limit in Colorado.

Steniolia obliqua Cress.

Male and female at Florissant, Col., June and July, some at fls. of *Edwinia americana* (Roh.) ; Ward, Col., July, 1905, at fls. of *Gilia* (Ckll.) ; Wet Mountain Valley, Custer Co., Col. (Ckll.). This is the most common Bembicid in the mountains. So far it is not been reported from the plains.

STICTIA Illiger.

Males.

Middle femora smooth beneath ; pulvilli distinct ; second ventral abdominal segment without spines beneath . . . . . **pectifrons** Sm.

Middle femora carinated or spined beneath . . . . . 1.

1. Second ventral segment unarmed ; pulvilli distinct . . **speciosa** Cress.
   Second ventral segment with two small tubercles . . . . . 2.
2. Pulvilli large, distinct ; larger ; femora mostly black. . **emarginata** Say.
   Pulvilli small, indistinct ; femora black at base only ; smaller. **pulchella** Cress.

Females.

Pulvilli small, indistinct (anterior wings beyond third abdominal segment) . . . . . **pulchella** Cress.

Pulvilli large, distinct . . . . . 1.

1. Dorsulum with a U-shaped yellow mark (legs mostly yellow). **speciosa** Cress.
   Dorsulum without a U-shaped yellow mark 2

2. Femora largely black; metanotum black; larger . . **emarginata** Say.
Femora mostly yellow; metanotum in part yellow; smaller.
pictifrons Sm.

Stictia pictifrons Sm.

Female, Livermore, Col., July 8, 1900.

Stictia emarginata Say.

Female, Livermore, Col., July 15, 1900.

Stictia speciosa Cress.

Female, Sterling, Col.; female, Lamar, Col.

Stictia pulchella Cress.

There are no specimens of this species in the collection, but it has been reported from Colorado by Fox, Cresson and Ashmead.

Synopsis and Bibliography of California Siphonaptera.

By M. B. Mitzmain, B. S.,
Entomological Laboratory, University of California.

The science of preventive medicine is growing apace with the commercial aggrandizement of the tropics and sub-tropics. It is leaving a profound impression on the very vitals of their economics. At present the Pacific metropolis, San Francisco, is in the throes of a sanitary upheaval conducted under the efficient guardianship of the greatest of exponents of preventive medicine, the U. S. Public Health and Marine Hospital Service. The campaign is a reactionary movement against the inroads of the dreaded oriental plague. Science has pointed its finger at the flea as the specific carrier of the pest germ.

The recent epidemic has given the flea a recognition which makes it pre-eminently notorious among insect foes. The following synopsis covers the species recorded in California. There are two species discovered on rats in San Francisco by Past Assistant Surgeon Fox, of the U. S. Public Health and Marine Hospital Service, which have not as yet been described. Dr. Fox is also responsible for the finding of *C. ignotus* on the California gopher. The rat fleas herein recorded have been collected by the writer during an inspection of over two thousand rats from the San Francisco Bay region.

FAMILIES.

A. Rhynchoprionidae (head not strongly angulated anteriorly and thoracic segments not strongly shortened and constricted B.)

B. Pulicidae. (Spines on posterior tibia in pairs C).

C. Ctenopsyllidae.

A. RHYNCHOPRIONIDÆ.

1. Argopsylla gallinacea (Westwood) Enderlein.

1875. Westwood Ento. Mo. Mag. 31-246 (Sarcopsylla gallinaceus).

1901. Enderlein Zool Jahrb. Abth. f. syst. XIV-552 (Sarcopsylla gallinacea).

1904, Baker. Proc. U. S. Nat. Mus. XXVII-375 (Xestopsylla gallinacea).

On poultry and farm animals, occasionally man.

B. PULICIDÆ.

1. Anomiopsyllus californicus Baker (Hind coxal epiphysis narrowing into coxae with a poorly defined notch or none 2) 1904 Baker, Invert Pacif. i, 39.

1906. Baker Proc. U. S. Nat. Mus. XXIX, 140.

On the skunk *Spilogale phenax*.

2. Pulex irritans Linn. (Pronotum with ctenidia 4, or ocular bristle near upper border of eye 3).

1746. Linnaeus Faun Suec. 1695. '04 Baker, Proc. U. S. Nat. Mus. XXVII, 379.

('07. Mitzmain. Bull. Cal. State Board Health III, No. 5 p. 39).

The human flea found on man, poultry and rats.

3. P. cheopis. Roth., '03. Rothschild Ent. Mo. Mag. XIV, 85, Pallidus '07, Mitzmain Bull. Cal. State Board Health. III, 39.

Oriental rat flea on rats and occasionally other animals including man. The most important agent in the transmission of plague.

4. Ctenocephalus canis. Curt. (head without ctenidia 5) '04 Baker. Proc. U. S. Nat. Mus. XXVII, 384. '07 Mitzmain Bull. Cal. State Board Health. III, 39. Pulex 1826 Curtis, Brit. Ent. III, 8. The cat and dog flea. On man, domestic animals, and the brown rat.

5. Hoplopsyllus anomalus. Baker (Pronotal ctenidia with more than nine spines 6) '06. Baker Proc. U. S. Nat. Mus. XXIX, 130-144. Pulex '04. Baker Proc. U. S. Mus. Nat. Mus. XXVII, 381. On California ground squirrel. *Citellus beecheyi*.

6. Ceratophyllus acutus. Baker (Apical spur of second joint of hind tarsi scarcely or not exceeding third 8. Eyes vestigial, second genal row with five bristles 7).

'04. Baker Invert. Pacifica I-40.

'06. Baker Proc. U. S. Nat. Mus. XXIX, 135, 146.

On California Ground Squirrel *Citellus beecheyi.*

7——— ignotus, '04. Baker Proc. U. S. Nat. Mus. XXVII, 388, 416, 443, 458, '06. Baker U. S. Nat. Mus. XXIX, 134.

On California pocket gopher. *Thomomys bottae.*

8——— abantis Roth. (The normal basal pair of lateral spines on last joint of hind tarsi dislocated toward the median line 10-or labial palpi, extending beyond coxae 9) '05 Roth. Novit. Zool XII, 164.

'06. Baker Proc. U. S. Nat. Mus. XXIX, 132, 146, 161, 164.

9.———proximus Baker, '04. Baker Proc. U. S. Nat. Mus. XXVII, 412, 446. On ground squirrel. *Citellus sp.*

10.———sexdentatus Baker (Hind femora with row of spines 11) '04. Baker Proc. U. S. Nat. Mus. XXVII, 403, 448. On brush rat, *Neotoma sp.*

11.———californicus. Baker (First joint of middle tarsi not distinctly longer than second 12) '04. Baker Proc. U. S. Nat. Mus. XXVII, 395, 440. On field mouse, *Microtus californicus.*

12.———ciliatus. Baker (A single row of bristles on ventral abdominal segments 13) '04. Baker Proc. U. S. Nat. Mus. XXVII, 397, 441, on chipmunk, *Eutamias sp.*

13.———fasciatus. (Bosc), Curtis, '07 Mitzmain Bull. Cal. State Board Health III, 39. Pulex '01 Bosc d'Antic. Bull. Sci. Soc. Phil. 111 No. 44, 156. European rat flea. On rats and mice and occasionally on other animals and man. Demonstrated to be an agent in the conveyance of bubonic plague on the Pacific Coast.

C. CTENOPSYLLIDAE.

1 Ctenopsyllus musculi (Duges) Wagner.

1898 Wagner Horae Soc. Ent. Ross XXXI, 577.

Pulex 1832 Duges Ann. d'Sci. Nat. XXVII, 163. The European mouse flea—on rats and mice.

WE HAVE RECEIVED an interesting letter from Dr. McCook. He says: "I have just finished the MS. of my book—'Ant Communes and How They Are Governed; A Study in Natural Civics.' It will be issued next spring by Harpers, who printed my 'Nature's Craftsmen' a year ago. In connection with the first part of that book it will complete my popular studies of ants, giving a summary of my long observations and bringing the leading facts of their known habits up to date. My first printed studies were of the Pennsylvania carpenter ant, *Camponotus pennsylvanicus,* and appeared in the Transactions of our American Entomological Society, December, 1876, thirty-two years ago! Ah, what changes in that generation. Next year is our fiftieth anniversary. Should we celebrate the semi-centennial? We should at least have a special historical number."

Standards of the number of eggs laid by Insects—.VII*

Being averages obtained by actual count of the combined eggs from twenty (20) depositions or masses.

By John J. Davis, Office of State Entomologist, Urbana, Ill.

The following table gives the actual counts of the numbers of eggs in twenty egg-masses of *Pseudococcus citri*. They were collected on *Salvia* in a greenhouse at Urbana, Illinois, March, 1907. The table shows a wide range in the numbers per egg-mass, namely: 147 to 414; but, as will be seen in the successive averages, there was little divergence from the final average.

The "corn" or clay-colored eggs are laid in a mass beneath and spreading beyond, the tip of the abdomen in an entanglement of white cottony secretion. They are elliptical-oval, somewhat glossy, and measure 0.309 to 0.326 mm. in length, and 0.146 to 0.180 mm. in width. The average, from 15 eggs measured, was .0313 mm. in length by 0.164 mm. in width.

8. Pseudococcus citri (Risso).

No.	No. counted per mass	Successive Totals	Av. per Egg mass	Max.	Min.	Range
1	354	354	354.			414
2	346	700	350.			
3	210	910	303.3			
4	157	1067	266.6			
5	414	1481	296.2	414		
6	208	1689	281.5			
7	346	2035	290.7			
8	302	2337	292.1			
9	166	2503	278.1			
10	319	2822	282.2			
11	292	3114	283.1			
12	159	3273	272.7			
13	391	3664	281.8			
14	180	3844	274.5			
15	206	4050	270.			
16	399	4449	278.1			
17	266	4715	277.3			
18	147	4862	270.1		147	
19	292	5154	271.2			
20	329	5483	274.1			147
20		5483	274.1	414	147	267

* "This series will hereafter contain independent articles by myself and Mr. J. J. Davis, who has consented to include such studies along this line that he may make from time to time, in order to bring them together under the same general heading for the convenience of bibliographers and others. No. VII is Mr. Davis' first of this series. For similar studies by Mr. Davis on *Samia cecropia* Linnaeus, *Pulvinaria innumerabilis* Rathvon and *Culex pipiens* Linnaeus, see Ent. News, 1906, pp. 368-369.

For the first six of this series, see Ent. News, 1901, p. 305; 1904, pp. 2-3; 1905, p. 167; 1906, p. 6; 1907, p. 89, and 1908, p. 4.—A. A. Girault."

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

To Contributors.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, three weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form, will be given free, when they are wanted; and this should be so stated on the MS., along with the number desired. The receipt of all papers will be acknowledged.—ED.

PHILADELPHIA, PA., OCTOBER, 1908.

It is held that about 999 house-flies in every thousand breed in horse excrement, and horse excrement is manufactured in and around stables. House-flies have several important functions; they make the bald-headed individual wonder whether life is worth living and wipe their dirty feet all over the jam and other articles of food. They are not a bit particular where they walk and are just as likely to wade into a *Bacillus typhosus* discharge as anything else. It costs from five to three hundred and fifty dollars to screen a house, and we think a law something like the following would be appropriate: An Act. Be it enacted etc., That on and after this date stable owners shall supply and pay for all window and door screens for their neighbors' houses within a radius of one-quarter of a mile from said stable or stables. Be it further enacted, that no stable owner be allowed to screen his own home and that he be compelled to eat house-flies in his cake in lieu of raisins, pay all doctors', druggists' and undertakers' bills when any of his neighbors die of typhoid fever or kindred diseases. There shall be no other penalties enforced.

TACHOPTERYX (ODONATA) IN VIRGINIA.—On June 12th, I took two specimens ♂ and ♀ of *Tachopteryx thoreyi* at Great Falls, Va. One at 11 in the morning, the other at 4 P. M. Both were resting vertically on the trunk of tree. Several places near by where the water is nearly dried up. Neither specimen was hard to capture. On June 25th, at Great Falls, I again took *Tachopteryx thoreyi*, 2 ♂ and 1 ♀; the latter on a log across the path, others on trees. Not hard to catch. Saw two or three more.—NATHAN BANKS.

Entomological Literature.

INHERITANCE IN SILKWORMS, I. By Vernon L. Kellogg, Professor of Entomology and Lecturer in Bionomics, with the partial collaboration of Ruby Green Smith, former Instructor in Entomology Leland Stanford Junior University Publications, University Series No. 1.

This is a work of 89 pages and four plates. For a number of years Prof. Kellogg has given much study to the biology of the silkworm and this important paper is one of the results of his investigations.

INSECT STORIES. By Vernon L. Kellogg. Published by Henry Holt & Co., New York. Price by mail, $1.62.

Professor Kellogg has, in this volume of strange, true stories, succeeded in describing the habits of certain insects in so fascinating a way that there are few people, either old or young, who will not be held by its charm. Simplicity is the keynote to the studies and observations of the old scientist and the little girl who figure in the book, and their ingenuousness and the subtle humor, hold one's interest as much as the marvelous doings of the little ground folk themselves.

It is a splendid illustration of how interesting a book of natural history stories may be, while yet purified of all "nature faking" and of all the exaltation of animal hero-composites so popular in recent years.

THE MOUND-BUILDING PRAIRIE ANT. By T. J. Headlee and G. A. Dean. Kansas State Agricultural College (Agricultural Experiment Station) Bulletin 154 (April, 1908).

It is quite pleasing to see an original and interesting piece of work from an Agricultural Experiment Station. This paper tells the life of *Pogonomyrmex occidentalis* Cresson in a concise and graphic way and the species is of considerable economic importance as its mounds must be a great nuisance to farmers in some sections of the country. The half-tone illustrations are excellent, but lose much of their effectiveness by not being printed on plate paper. We consider this a model short paper and would be delighted to see more like it from our Experiment Stations. The article purports to be under the joint authorship of T. J. Headlee and George A. Dean. Mr. Headlee is entomologist and Mr. Dean assistant entomologist to the Station. A foot note says: "The work on this bulletin as printed was independently planned and executed Mr. Dean, who also made the photographs for illustrations." It therefore appears that Mr. Headlee had nothing to do with the work. This is therefore a most reprehensible piece of officialism and a kind of piracy that we thought had ceased to exist.—H. S.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

C. F. BAKER is returning to Claremont, California, as Associate Professor of Biology in Pomona College.

AFTER September 1, 1908, my address will be Bussey Institution, Forest Hills, Boston, Mass.—W. M. WHEELER, Professor of Economic Entomology, Harvard University.

SPHAERIDIUM SCARABAEOIDES, LINN. IN OHIO.—August 22, 1908, while collecting near Ira, Summit County, Ohio, I found numbers of the above introduced beetle. It was swarming in piles of fresh cow excrement.—CHARLES DURY.

THE trustees of the Massachusetts Agricultural College at Amherst have voted to establish a graduate school with Professor Charles H. Fernald as its head. It will confer degrees of master of science and doctor of philosophy.

JUNONIA COENIA.—While collecting near York, Maine, on August 19th, I saw (within five feet) but failed to secure, a fresh specimen of *Junonia coenia* Hbn. It was darker in color than specimens taken on Long Island and in Connecticut, resembling rather the dark specimens often seen in southern Florida. I do not know whether its occurrence so far north has been recorded previously.—W. C. WOOD, New York.

DR. W. J. HOLLAND WEARING DECORATIONS CONFERRED UPON HIM BY EMPEROR WILLIAM OF GERMANY AND PRESIDENT FALLIERES OF FRANCE.—Dr. W. J. Holland, former chancellor of the Western University of Pennsylvania and now director of the Carnegie Museum, has been honored by both the Emperor of Germany and President Fallieres of the French Republic, who conferred upon him the orders of the Knight of the Crown and Officer of the Legion of Honor. He is the first Pittsburger and the first man in the United States to be doubly honored in this manner.

Dr. Holland will rarely wear these orders in public. In Europe on public occasions it is the custom to wear all such decorations. In America it is not customary, and so Dr. Holland will only wear them on special occasions.

The Royal Prussian Order of the Knight of the Crown, is a cross of white enamel inscribed, "Gott Mit Uns." The order was founded by Emperor William in 1861.

The cross of Officier de la Legion d'Honneur is a five-pointed cross bound in gold. It differs from the original form of the cross as it was first fashioned in the days of Napoleon I, as France is now a republic.

Dr. Holland is known to all entomologists through his valuable books and papers.

THE LITTLE MEN OF SCIENCE.—Lord Rosebery's character sketch of Lord Kelvin was fine and felt. "What most struck me was his tenacity, his laboriousness, his indefatigable humility. In him was visible none of the superciliousness and scorn which sometimes embarrass the strongest intellects. Without condescension he placed himself at once on a level with his companion. That has seemed to me characteristic of such great men of science as I have met." We have often wondered how it is that while the great men of science—the Darwins, Kelvins—are like this, the smaller men, the men who have never originated anything but have merely tried to suck in the ideas of the masters, so often are impatient, spiteful, jealous, assertive, impressed as profoundly by their own superiority as by the stupidity of nine-tenths of humanity. That this is the attitude of the lesser fry of science, its sticklebacks and tadpoles no one will deny. The little scientist is almost invariably too clever by half. He hangs up pictures of Darwin in his study. His talk is of Darwin. Yet he has as little of the heart as he has of the brain of that great master.—*From the Saturday.*

DR. ALFREDO DUGES, of Guanajuato, Mexico, has sent a wasp to the U. S. Bureau of Entomology, which has been determined by Mr. J. C. Crawford as *Polistes carnifex* Fabr. It is a male specimen. Concerning this insect Doctor Duges writes:

"In a metal box you will find a yellow hymenopterous insect, the only one which I have been able to obtain, for the people of the country have such a fear of it that I can engage no one to collect it. It is by chance that the individual which I send you has been found dead. It comes from Barranca de Ahüijillo, south of the State of Jalisco, on the border of Michoacan. They call it Ahorcadora (strangler) or Emborrachadora (that which intoxicates), because its sting occasions a rush of blood to the head, violent fever, and a sensation of strangulation. It is said that death arrives in a quarter of an hour if the wound is not sucked. This insect is, then, a curious one from the point of view of the fright which it causes. You know how prejudiced country people are, so that no one can never tell the exact degree of truth there is in such stories."

FIGHT MOTHS WITH LIGHTS.—Saxon Authorities Adopt Novel Plan To Protect Forests From Pest.—Zittau, Germany, August 8.—The Saxon authorities have discovered what seems to be an excellent way to put an end to the caterpillar plague which is ravaging local forests, by a method of catching the brown nun moths that lay the eggs from which caterpillars come in enormous quantities.

They make use of an electric light lamp, consisting of two powerful reflectors placed over a deep receptacle, and powerful exhaust fans, erected on top of the municipal electric plant. At night two great

streams of light are thrown from the reflectors on the wooded mountain sides half a mile distant. The results have been astonishing. The moths, drawn by the brilliancy, come fluttering in thousands along the broad rays of light, until near the reflectors, when the exhaust fans, with powerful currents of air, swirl them down into the receptacle.

On the first night three tons of moths were caught. It has been decided to build another trap on the Rathhaus tower, and the fight with the moths will be continued.

The forests of central Europe have from time to time been ravaged by moths from Russia, whose larvae denude the trees of their foliage. The splendid pines of the Lausitz Mountains are this year threatened with destruction.—*Newspaper.*

DR. C. L. MARLATT, *Bureau of Entomology, United States Department of Agriculture, Washington, D. C.*

DEAR DR. MARLATT: A little over two weeks ago there was a very marked migration of butterflies that took place in this vicinity, Miami, Fla., in early June. For a week or two from daylight to dark the air was full of butterflies,* resembling closely the cabbage butterfly, flying south. They usually flew fairly close to the ground, rarely ascending higher than the tops of the trees, mostly keeping within ten feet of the ground. The belt extended from the shore westward to the everglades, and possibly out into the everglades, which were dry at the time, but they were present in the greatest numbers within half a mile of the shore. Apparently the same migration was noticed about 200 miles north of here along the Indian River, and on a trip I made to Key West at the time, I found that the butterflies were present in great numbers on the line of Keys extending south and southwest from the east coast of Florida. They were still keeping up their southerly flight on Key Largo. However, only a few were seen as far south as Knight's Key, the terminus of the railroad, and these, instead of continuing out over the water, seemed to be flying around on land in a more or less confused manner. At the time the swarm was about the greatest Mr. Fawcett (my scientific assistant) made observations on the number passing and found that in a space one rod wide 300 passed on the average in five minutes, making about 120,000 an hour crossing a line a mile long; since they were flying from early morning till dark, it would mean that probably over a million and a half would cross such a line a day. As this was kept up for two or three weeks, you may imagine what a number of butterflies must have passed. I am sending you a small box containing a few that Mr. Fawcett collected at that time. A few butterflies of apparently the same species are still around.

Very truly yours,

ERNST A. BESSEY,
Pathologist in Charge, Sub-tropical Laboratory.

KEEPING A LOG.—I once read in the NEWS, from the facile pen of Annie Trumbull Slosson, of how she worked an old log in Florida for insects, and what interesting captures she made. May 17, 1906, I found a small uprooted stump and log in a shady woods, alongside of a path. The decaying wood was damp and fungus-grown, and of a

**Pieris monuste.*

rusty red color. The log and roots were honeycombed by several species of ants. I worked May 17th, 19th and 22nd crumbling and sifting this log; every inch of it was worked over. I found it a veritable mine of coleopterous treasures. I took more than 300 beetles from it, a number of which are new to me. It was swarming with *Pselaphidae, Scydmaenidae* and *Trichopterygidae*. Maj. Casey has described three species of these *Pselaphidae* in Can. Ent., August, '08. Many of these beetles were exceedingly minute, such as *opressus, luteus* Csy. and *Leptoplectus exilissimus* Csy. being the smallest of their respective families. The little Tenebrionid, *Dioedus punctatus* Lec. was in numbers, those freshly hatched being pale, while the mature ones were jet black. This species can generally be found in red rotten wood. I collected only the coleoptera, though other orders were numerously represented. The proper conditions as to season, degree of moisture and food were present in this log, a combination of conditions not always to be had together. When a collector finds such a favorable combination, the locality should be worked until exhausted. In the language of the Hoosier schoolmaster, "While your gittin', git a plenty." In a locality that has been so thoroughly gleaned as Cincinnati, it is only by patient search for the small forms that new species can be found.—CHARLES DURY.

DEALS DEATH TO THE FLY.—French Surgeon Has Preparation That Is Terrible and Certain.—Doctor Delamarre, an eminent army surgeon, has just published the result of his investigations concerning the contagion-bearing qualities of the ordinary housefly. Without hesitation he condemns that familiar insect to death. He points out that numerous plans for executing this sentence have been evolved by scientists of all times and every country, but flies are apparently as numerous as ever.

He suggests a mixture composed of one part formol to nine parts of water. This may be put in ordinary plates, and placed wherever flies are likely to congregate. Twenty-four hours later, says the doctor, not only the plates themselves, but a considerable space around them, will be covered by flies and mosquitoes which the mixture and emanations from the mixture have poisoned. The insects are attracted by the solution as though it were sugar. To be perfectly effective it should be changed every twenty-four hours.—*Newspaper.*

Doings of Societies.

PHILADELPHIA, June 17th, 1908.

At the meeting of the Feldman Collecting Social, held at the residence of Mr. H. W. Wenzel, fifteen members were present.

A letter from Professor Philip P. Calvert was read, in which he stated that he had examined the scale insects exhibited at our last meeting, and found them to be the San Jose scale; slides were also shown.

Mr. H. W. Wenzel read a communication from Mr. Wm. D. Kearfott, with reference to *Evetria wenzelli,* a new species bred on Jersey Pine, *Pinus virginiana* Mill.

Mr. H. W. Wenzel stated that after having read Mr. Manee's article in "News," p. 286, '08, in which reference is made to the habits of *Strategus antaeus,* he had found the said species at Malaga, N. J., under the same conditions as stated in this article; Mr. Wenzel said that this is the westernmost point at which he had collected this species.

Mr. Geo. M. Greene exhibited specimens of *Mygale avicularia,* "Bird-killing Spider," from Para, Brazil.

Mr. Geo. M. Greene reported the finding of larvae of *Trichius piger* at Castle Rock, Pa., on April 17th, 1908, in dead oak. The larvae pupated on April 19th, and the imagos appeared on April 27th.

Mr. H. W. Wenzel suggested the planting of little twigs along the edges of lakes, say two feet above the water, for the purpose of collecting Odonata.

Mr. C. T. Greene reported captures of the following Diptera: *Theresia tandroc* Desv., 58 specimens in two days, by Geo. M. Greene, and C. T. Greene, at Malaga, N. J., August 4th and 5th, 1907. *Sphegina keeniana* Will., by Frank Haimbach, at Roxboro, Phila., Pa., May 17th, 1908. *Dexia vertebrata* Say, at Lehigh Gap, Pa., July 13th, 1907. *Symphoromyia hirta* Johnson, at Roxboro, Phila., Pa., May 31st, 1908. *Sphecomyia vittata* Wied., by Geo. M. Greene, at Unionville, Phila. Co., Pa., May 3d, 1908, and *Palloptera superba* Loew., by Geo. M. Greene, at Roxboro, Phila., Pa., June 7th, 1908.

Mr. Daecke exhibited a specimen of *Lapara coniferarum* S. & A., bred from a larva found at Brown's Mills, N. J., in October, and which emerged on June 2d, 1908.

FRANK HAIMBACH, *Secretary.*

A meeting of the Newark Entomological Society was held March 9th with sixteen members, and Dr. H. D. McCormick, a visitor, present. Mr. Edwin Holden, of Newark, was elected to membership.

Mr. Wasmuth exhibited specimens of *Hyperchiria pamina, Attacus jorulla* and *Eacles imperalis* var. *didyma;* also two fine variations of *Philosamia cynthia,* in which the lavender posterior-transverse cross line was three times the ordinary width and without a defined internal edge; the angular anterior-transverse line, also, was unusually broad, much further removed from the base of the wing than ordinarily and connected with the t. p. line, forming therewith a well-shaped K. In consequence of the abnormal breadth of the t. p. line the discal lunules were deeply inserted into it. Altogether, they were widely remote from the normal type. These specimens were bred from cocoons collected in the vicinity of Brooklyn.

Mr. Kircher showed a box of Hymenopterous parasites bred from chrysalids of *Papilio turnus.* From twenty-four pupae collected at random, he obtained one perfect butterfly, one crippled example, seventeen *Psilomastex exesorius,* and, from two, a multitude of Chalcids. The remaining three pupae were hard and dry. He also exhibited a box of *Catocala,* showing the range of variation in *relicta, amatrix, parta, unijuga, habilis* and *basalis.*

Mr. Wormsbacher reported the following species of Lepidoptera from New Jersey:

Acronycta modica, Guttenberg, June 30th.
Sarrothripa lintnerana, Guttenberg, July 30th.
Hadena diversicolor, Edgewater Heights, September 10th.
Euxoa velleripennis, Guttenberg, August 20th.
Feltia volubilis, Guttenberg, May 25th.
Mamestra congermana, Fort Lee, July 30th.
Lithomia napae, Forest Hill, April 20th.
Scopelosoma morrisoni, Forest Hill, April 4th.
Polychrisia formosa, Edgewater, August 4th.
Eutolype rolandi, Forest Hill, April 11th.
Cossus centerensis, Guttenberg, June 30th.

He also read a paper on the occurrence of *Chlaenogramma jasminearum* at Fort Lee, N. J., where in certain years the species was collected in the egg and larvae stages in numbers, but in other years was entirely absent. He believed that the

species was a southern one and that it is unable to maintain itself in a northern latitude. The periodical occurrence of the larva he explained by the supposition that the impregnated females migrated northwardly and laid eggs which developed mature larvae. The pupae, however, are unable to survive the winters and consequently another brood would depend on another chance wanderer.

This supposition lacked the support of the other members who believed that if the species were truly a migrant, it would not continually pass over certain regions harboring its food plant immediately to the south of Fort Lee, where the insect had been often searched for but never found. It would be more reasonable to suppose that in the off years the species was reduced almost to extinction by parasitism, and that it took several years to again multiply to noticeable numbers.

Mr. Erhard showed specimens of *Phlyctaenia profundalis* Pack. (Lep.) and *Elcodes grandicollis* Mann. (Col.) taken alive at Newark, N. J., from celery imported from California and a number of living Conacephalids shipped with the same product from Florida.

JOHN A. GROSSBECK, *Secretary.*

A meeting of the Newark Entomological Society was held on April 12, with twenty-one members present, and Messrs. Chris. Roberts, of Connecticut; Henry Dietz, of Newark, and Chas. J. Martin, of Brooklyn, visitors. Dr. H. D. McCormick, of Little Falls, was elected a member.

Mr. Roberts addressed the Society on how and where to collect aquatic Coleoptera. Of first importance is a strong-rimmed net, perfectly rigid, and capable of resisting a dense vegetation. Deep water harbors little beetle life, but water several inches in depth or less is exceedingly prolific, and in using the net it is best to begin as far out from the shore as the shallow water extends and work inward. It is a habit of the insects to dart away from the pursuer into deep water if the opposite method is followed. If a long bag is used the contents

need not necessarily be examined after each sweep, but when a considerable quantity of matter is accumulated it may be spread upon a piece of cloth, carried for the purpose, upon the shore, and when ten minutes or so has elapsed the beetles will leave the drying mass—sometimes by the hundred. One of the best places to collect is along the edges of shallow water areas among the vegetable mould and old leaves. The material is swept up with a net, placed on a cloth as above described, and broken up into small pieces in order that dessication may begin promptly. At first the mass may seem devoid of life, but as the material becomes dry, the beetles will begin to emerge. In this way Mr. Roberts has taken hundreds of *Hydroporus difformis* which until then had been regarded as an extremely rare insect. To collect in flowing streams a loosely woven cloth should be stretched across and through the stream, and the stones, gravel and sand overturned and stirred up a short distance above it. The dislodged beetles will be swept into the cloth to which they will cling for support, and it is only necessary to draw up the cloth and reap the harvest. On one occasion Mr. Roberts collected by actual count seven hundred beetles in this manner after stirring up about two feet of sand and gravel.

He also spoke of the absolute necessity of mounting small aquatic Coleoptera from the side, *i. e.*, by bending the tips of the point downward at an angle to conform to that of the side of the beetle and attaching the specimen in such a way as to leave the center and one-half the under side free. Color is often deceiving in the identification of water beetles; but the characters on the underside are good and reliable, hence the necessity of this method of mounting.

Mr. Brehme exhibited a box of *Hemileuca electra,* showing the tendency toward black individuals, and Mr. Wasmuth exhibited a specimen of *Telea polyphemus* with almost black secondaries.

Mr. Doll showed specimens of *Papilio acauda* Oberth. and spoke of the differences between that species and *P. philenor.*

JOHN A. GROSSBECK, *Secretary.*

OBITUARY.

PROF. PAUL BIOLLEY.

Among the numerous naturalists which Switzerland has given to the world the late Paul Biolley occupied a noteworthy place. Born at Neufchatel, February 15, 1862, the son of Prof. August Biolley, he studied in his native city, taking his degree in letters. In 1885, after teaching two years in Holland, he was selected with two other compatriots, by the government of Costa Rica to organize in the capital of that republic a college—the "Liceo de Costa Rica." There he remained many years, also occupying a professorship at the Girls' College—"Liceo de Señoritas," as well as teaching in the city of Cartago. In the years of his teaching he trained many young men who are now prominent citizens of the republic of Costa Rica.

Prof. Biolley's right to our recognition rests, however, not upon his work as a teacher, but upon years of indefatigable natural history field work in his adopted country, the invertebrate fauna of which he undoubtedly knew better than any living man. Soon after his arrival in the country he began studying its natural history, preparing collections of botanical specimens, insects, reptiles, etc., his spare time for years being thus occupied. His excursions yielded material of very great value and the results enriched the two scientific institutions of the republic, the "Instituto Fisico Geográfico" and the "Museo National," while collections of great value were sent to specialists and museums in Europe and the United States. His work was continuous, from early morning until late at night, both in the field and in his room. All of his excursions, even those to distant places, were made on foot and his work was not merely collecting, but with his keen powers of observation he noted many facts concerning the life of the animal, and the labels placed by him on his material bear witness to the intense interest he had in his work.

He maintained a valuable correspondence with prominent naturalists and his numerous collections sent to them gave rise to a number of publications, forming, no doubt, the most complete series of papers on the natural history of Costa Rica.

Through his work many new species were made known to science and a considerable number were named after him. The peculiar roach, *Biolleya alaris,* taken by him, was dedicated by the late Dr. Henri de Saussure in recognition of his work.

Several books on botany and zoölogy were published by him, while numerous zoölogical papers came from his pen, one of the last being a study of the mollusca of Cocos Island. On public instruction his opinion was held in high esteem and among other things he published a Greek and Latin grammar for use in the Costa Rican schools. For the Paris Exposition of 1900 he prepared an interesting and unbiased work on Costa Rica, and he was the mainstay of the National Society of Agriculture, contributing valuable papers to every Bulletin published. Death came just as he was preparing a resumé of his twenty-one years of continuous work and study, and, as he was a man of order, it will be possible at any time to publish the work. His demise occurred at San José, January 16, 1908, from pneumonia.

Personal knowledge of Prof. Biolley's work compels us to pay some tribute, in addition to the facts given above, if only in return for the very valuable collections which he transmitted to us for study, work on a particularly extensive sending having occupied our attention when news of his death reached us. With the greatest generosity and most hearty spirit of co-operation this energetic and enthusiastic colleague sent specimens, lot upon lot, unconditionally, supplying most complete capture notes, while at the same time he stirred up and sustained interest in the same field in others around him. We who have good libraries and abundant opportunities to do that in which we are interested, do not fully realize and appreciate what devotion and energy in the cause are necessary to produce a man like Paul Biolley under the circumstances in which he worked.

Most of the notes in the above article concerning Prof. Biolley's life have been very kindly furnished by his intimate colleague, Prof. J. Fidelio Tristán, of San José, and E. H. Lankester, Esq., who during his residence in Costa Rica, became acquainted with Prof. Biolley. The portrait was kindly supplied by Prof. Tristán. J. A. G. R.

SIMON H. M. SEIB

It is with the deepest regret that we record the death of Simon H. M. Seib, of Jersey City, who died at his home on August 27th. Mr. Seib was an ardent collector and breeder of Lepidoptera who took great pains in mounting his specimens. He was one of the original members of the Newark Entomological Society; was its first president and held the office of treasurer at the time of his death.

MONSIEUR P. A. P. FINOT.

In the death of Monsieur Pierre Adrien Prosper Finot, systematic entomological science has lost one of its most devoted adherents. He was "Chevalier de la légion d'honneur" and "Capitaine d'état major en retraite." A most befitting tribute to his memory printed by his relatives in the form of a memoriam has been sent out to his correspondents in foreign lands. Monsieur Finot was 70 years old at the time of his death, April 14, 1908, and he lived at Fontainebleau, 27 Rue Saint-Honore. His published papers were mostly devoted to Orthoptera. His monographs were prepared with painstaking care and were often embellished with exquisite drawings made by his own hand. His plates and figures were works of art, showing a great refinement of the art sense as well as close devotion to his subject.

He will be remembered more, perhaps, by his well-known monograph on the Orthoptera of France, which is a model of its kind, though his other works are none the less valuable contributions to Orthopteran literature. He was always kindly and courteous toward correspondents, and his letters indicate a man of sympathetic scientific feeling.

J. L. Hancock.

Biological Experiment Grounds, Lakeside, Berrien Co., Michigan, July 9th, 1908.

PROF. GUSTAV MAYR.

Professor Dr. Gustav Mayr, the distinguished Hymenopterist and special student of the Formicidæ, died July 14th, 1908, at his home in Vienna, after a prolonged illness, in his 78th year.

THE LATE PROF. PAUL BIOLLEY.

EXCHANGES.

Not Exceeding Three Lines Free to Subscribers.

☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Wanted.—Correspondence with those desiring to exchange Lepidoptera this season. Living pupae also to exchange or sell in November.—A. F. Porter, Decorah, Iowa.

Lepidoptera.—Wanted parties to exchange specimens not native to New England. Write for offers.—Will Place, Jr., 13 Parkes Ave., Providence, Rhode Island.

Will collect in all Orders, in exchange for Lepidoptera—American and exotic.—P. A. Schroers, 3807 Folsom Ave., St. Louis, Mo.

I have a great many fine exotic species of Buprestidae in duplicates which I would like to exchange for North American Coleoptera.—G. Chagnon, P. O. Box 186, Montreal, Canada.

I have or shall have for exchange eggs, larvae and pupae of *T. modesta, Sm. geminatus, Dolba hylaeus, P. ajax, P. cresphontes, Catocala vidua, illecta, cara, palaeogama, habilis.*—R. R. Rowley, Louisiana, Mo.

I want *Pachybrachys* of North America, either by purchase or exchange. Correspondence solicited.—Fred. C. Bowditch, 164 Rawson Rd., Brookline, Norfolk Co., Mass.

I want to buy eggs of *Papilio ajax, turnus, cresphontes, asterias* and *Telea polyphemus* and *A. luna.* Will pay 6 cts. per dozen. Write to me before sending.—Sydney L. Wright, Jr., Logan, Phila., Penna.

Scarabaeidae of North America wanted for cash. Send price lists to W. C. Wood, 51 Fifth Ave., New York.

I have larvae of *Catocala illecta* feeding on honey-locust, and shall have chrysalids in a few weeks. From eggs of *C. piatrix* and *C. vidua* shall soon have larvae. Larvae of other later. Want *C. parta* and *C. amatrix.*—R. R. Rowley, Louisiana, Mo.

Wanted.—Parties to exchange Lepidoptera not native to New England for New England specimens. Write for offer to Will Place, Jr., 13 Parkes Ave., Providence, R. I.

Some Entomological Literature for exchange.—M. Bubna, 2629 Woodhill Rd., Cleveland, Ohio.

I'll be happy in corresponding and exchanging papers and material of study with economic entomologists, and especially with Miriopodologists and Acarologists.—Prof. Carlos E. Porter, Casilla 2352, Santiago, Chile.

For Exchange.—A subscription to the Macrolepidoptera of the world by Seitz. All parts complete to date.—Chris. E. Olsen, No. 1 Jefferson Ave., Maspeth, L. I., N. Y.

Wanted for Cash or Exchange.—Cocoons and pupae: *Pap. ajax, troiulus, cresphontes, achemon, turnus* and other *Papilio. T. modesta, H. chersis, luscitiosa A. bicolor, angelica, P. pandorus, Dar. versicolor, Cal. astylus, Cit. regalis, imperialis, hylacus, luna, polyphemus. Lapara coniferarum, C. nudulosa, S. germinatus, Paonias myops, P. quinquanmaculata, Attacus cecropia, jorulla, orizaba angulifera* and all other species of *Attacus.*—Joseph Sever, 335 E. 49th St., New York City.

I have for exchange cocoons and pupae of *P. podilarius, machaon; Sphinx ligustri, pinastri, euphorbiae, elpenor, porcellus, tiliae, occelata, populi, stellatarum; Saturnia pyri, pavonia; Aglia tau; End. versicolora, G. lanestris, Ph. bucephala, C. vinula, N. Ziczac,* and eggs of *Catacola fraxini, nupta, promissa, elocata* and *electa.*—Joseph Sever, 335 E. 49th St., New York City.

Wanted for Cash or exchange living pupae *Papilio turnus, troilus, philenor* at 5c. each; *excaecatus, geminatus, myops* at 5c. each; *modesta* 10c. each; *lineata* at 5c., *jorulla* at 7c., *Dat. nimistra* at 5c.—A. F. Porter, Decorah, Iowa.

Correspondence solicited with collectors who have been victimized by foreign dealers or collectors. Correspondence confidential. Object retribution.—Address A. F. Porter, Decorah, Ia.

Wanted.—Henshaw's Check List of Coleoptera. Will pay cash.—R. S. Woglum, Whittier, California.

Lepidoptera Wanted.—Catocala, Papilio, Arctians and other showy specimens of larvæ. Will send equally good things in return.—G. Eberhard, Berlin, Friedenau, Beckerstrasse t. Germany.

INSECTS OF NORTH CAROLINA

I am desirous of securing accurate data concerning occurrence of all species of insects in this State. Correspondence desired with parties or institutions having North Carolina material. Willing to pay for accurately prepared lists of any considerable number of species. Correspondence wanted with parties desiring material in certain groups from this State. Will gladly give suggestions to persons desiring to find suitable collecting grounds in this State for work at any season. In short, want the varied and interesting entomology of this State to be known and recognized by entomologists, and willing to assist in every way to make it known and get it recorded. About 300 miles of coast line and numerous mountain ranges and peaks 5000 to 6700 feet elevation; touches of subtropical and boreal faunas and all intergradations. In writing mention this advertisement.

FRANKLIN SHERMAN, JR, Entomologist
State Department of Agriculture, Raleigh, North Carolina

EXOTIC LEPIDOPTERA.

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